THE SENATE

SELECT COMMITTEE ON WORK AND CARE

Answers to questions taken on notice

Public hearing

Tuesday 20 September 2022, Melbourne

Answer from Professor Sara Charlesworth
Co-convenor, Work + Family Policy Roundtable;
Academic Expert, RMIT University

Question:

CHAIR: We're over time, Professor Charlesworth. I wonder if I could ask you to take two things on notice. You made a point very early on about how when men have a child they increase their hours of work, and you spoke in favour of a cap on long hours of work. I wonder if you could fill that out a little for us and give us any content or research that makes that case. We haven't had a lot of evidence on it, but it's potentially really important in terms of men's involvement in care.

Secondly, you mentioned Himmelweit's research on putting two per cent of GDP into construction versus the care economy. We'd be very interested in seeing that research as well.

Prof. Charlesworth: Absolutely. Yes.

Answer:

In response to the first issue raised by the Committee, I attach two main documents. The first I prepared from available data on the labour force participation rates of fathers and mothers with their youngest dependent child aged 0- 5 years. The second was prepared by Professor Lyndall Strazdins from the ANU, who is a member of the Roundtable. Soft copies of all the research papers to which her document refers are the third attachment.

In response to the second question, please see attached:

- Research by Jerome de Heanu, Sue Himmelwiet and others on the economic impact of investing in the care economy compared to the construction industry
    - The first 2016 report includes analysis of the impact in Australia.
    - An updated analysis of data in that report was undertaken in 2020 by de Henau and Himmelweit
    - The 2021 paper by de Henau and Himmelweit also comparing the impact of investment post COVID in care infrastructure with that in construction across the US and EU countries

Labour force (LF) participation of parents aged 20-74 with dependent youngest child 0-5 years, compared with total LF participation 20-74 and total LF participation 15-64.

LF Participation Rates	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Male participation rate 20-74 years (total)	78.4%	78.3%	78.3%	77.9%	78.3%	78.5%
Male participation rate 15-64 years	82.1%	82.5%	82.6%	82.3%	82.9%	83.0%
Male parent[1] participation rate 20-74 years with youngest child 0-5 years	93.6%	93.7%	93.6%	94.0%	93.9%	94.6%
Female participation rate 20-74 years (total)	65.0%	65.1%	65.9%	66.0%	67.1%	67.4%
female participation rate 15-64 years	70.4%	70.8%	71.7%	71.8%	73.0%	73.5%
Female parent[1] participation rate 20-74 years with youngest child 0-5 years	57.5%	59.7%	60.1%	60.7%	62.4%	64.2%

[1] in the same household as the dependant child
Source: Gender Indicators, Australia, November 2019.

Notes:

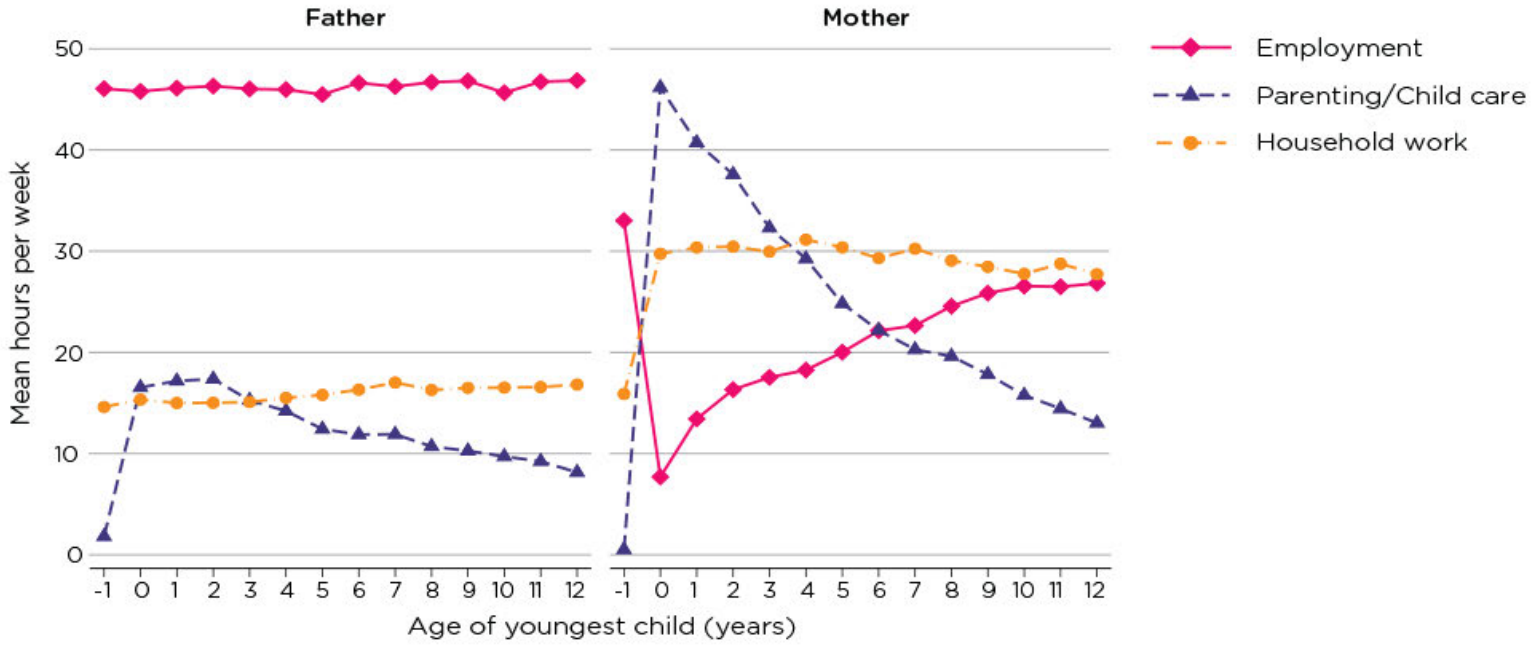
- The total participation rates of men and women aged 20-74 and of parents in this age group whose youngest child is aged 0-5 years has increased since 2013/14.
- However, relative to the total population aged 20-74, mothers and fathers whose youngest child is aged 0-5 have very different LF participation rates:
    - Fathers whose youngest child is aged 0-5 have a far higher participation rate than other men in this age group. In 2018/19 this difference was 94.6% compared to 78.5%
    - Mothers whose youngest child is aged 0-5 have a lower participation rate than other women in this age group. In 2018/19 this difference was 64.2% compared to 67.4%
- The difference between the LF participation rate of fathers and mothers aged 15-74 whose youngest child is aged 0-5 years has diminished over time but is still significant:
    - In 2013/14 this cohort of fathers had a LF participation rate of 93.6% compared to the comparable cohort of mothers who had a LF participation rate of 57.5% - a difference of 36.1 percentage points
    - In 2018/16 this cohort of fathers had a LF participation rate of 94.6% compared to the comparable cohort of mothers who had a LF participation rate of 64.2% - a difference of 30.4 percentage points

The gendered disparity between mothers and fathers in working hours and care and domestic responsibilities is highlighted in the following:

Culture of men's work trapping fathers

In an August article, Annabel Crabb asked why Australia's culture around work and parental leave means that when a family changes, it is women who change and adapt to the new reality. She drew on AIFS researcher Dr Jennifer Baxter's work, including a graph (see below) that she described as 'the baldest possible visual demonstration of how differently mother and fathers experience work and family balance'.

Figure 1: Mother and father's time use up to and after the birth of first child



Note: Age of youngest child = -1 is the year before the first birth.

Source: HILDA, pooled Waves 2 to 16

Credit: Australian Institute of Family Studies 2019 (aifs.gov.au/copyright)

Source: Australian Institute of Family Studies media release September 2019: https://aifs.gov.au/media/culture-mens-work-trapping-fathers

This highly gendered pattern of working and non-work time is almost identical to the ones Prof Strazdins and colleagues found in 2005 in the LSAC data (ie over a decade ago) which indicates how stuck this long hour and short hour pattern is.

See: Baxter, J., Gray, M., Alexander, M., Strazdins, L., & Bittman, M. (2007). Mothers and fathers with young children: Paid employment, caring and wellbeing. An Baxter, J., Gray, M., Alexander, M., Strazdins, L., & Bittman, M. (2007). Mothers and fathers with young children: Paid employment, caring and wellbeing. An analysis of growing up in Australia: The Longitudinal Study of Australian Children. Social Policy Research Paper no. 30, Canberra

LIMITING LONG WORK HOURS: SENATE COMMITTEE ON WORK AND CARE

Work time is central to the economic, physical, social and mental wellbeing of Australians. Having enough work is important to wellbeing, and working too much can impair it. Our own research shows that in contemporary Australia, around 38 hours a week is an optimal average (Dinh, Strazdins and Welsh, 2017).

Long work hours affect many workers, with 40% of employed Australians working more than the legislated National Employment Standard (NES) 38 hours, and just under one in ten employed men working more than 60 hours a week (pre-pandemic average of 9-10%; ABS 2021, 2020).

The true impact economically and socially is much wider, because when one person works long hours, their partner is pushed to cut back their hours, an equity, wellbeing and human capital loss (Cha, 2013; Cha & Weedon, 2014; Landivar, 2015).

Over the past 15 years our research has investigated wellbeing consequences of excess workhours, especially in families. We have documented the impact of long hours and the work-family conflicts they generate on children's, men's, women's and older worker wellbeing (Cooklin et al, 2016; Dinh et al, 2017; Doan et al in press; Doan et al, 2022).

The current work time arrangements are an artefact of the social conditions at the time they were developed (the early 1900's). They are creating inequities in employment opportunities and are causing significant harms to the population (Pega et al, 2021). Long hour jobs exclude large numbers of people who combine jobs with care (of children or elders; Doan et al, 2021).

Our research supports the case for taking action to address inequities due to long work hours. The right action will help achieve the potential health, wellbeing and gender equality benefits of a working week where women and men can both work and care. We suggest an iterative, and evidence-based process.

Lyndall Strazdins and the W+FPR, October 2022

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Journal of Marriage and Family

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Long Hours and Longings: Australian Children's Views of Fathers' Work and Family Time

Using two waves of paired data from a population sample of 10- to 13-year-old Australian children (5,711 father–child observations), the authors consider how the hours, schedules, intensity, and flexibility of fathers' jobs are associated with children's views about fathers' work and family time. A third of the children studied considered that their father works too much, one eighth wished that he did not work at all, and one third wanted more time with him or did not enjoy time together. Logistic regression modeling revealed that working on weekends, being time pressured, being unable to vary start and stop times, and working long hours generated negative views in children about fathers' jobs and time together. The time dilemmas generated by fathers' work devotions and demands are salient to and subjectively shared by their children.

Even as mothers' employment rates have risen, expectations on fathers to remain employed and be successful have changed little. Yet new framings of fatherhood are now in play, with many fathers also striving to be available, nurturing caregivers involved in the daily lives and routines of their children (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000). Providing money is necessary but no longer sufficient, and a good father "is prepared to put work second and family first" (Henwood & Procter, 2003, p. 343). Being available entails spending time with children, and being engaged means attending to and being responsive when with them. Although time with children is a marker of love, care, and commitment, earning income also takes time, and the jobs fathers typically hold or aspire to embed their own time devotions (Williams, Blair-Loy, & Berdahl, 2013).

At issue is how the time required for earning income conflicts with fathers' time for children and with what consequences for families. Our article focuses on the consequences as viewed by children. We investigate how the gendered time devotions and imperatives of contemporary jobs, reflected by how long and when fathers' work as well as their work time intensity and flexibility, are shaping what children experience and hope for. To achieve this, our analysis combines the perspectives of children aged between 10 and 13 years with fathers' reports of their work time

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Key Words: child well-being, families and work, fathers, time use, work–family balance, work hours.

and work–care conflicts, drawn from a nationally representative cohort of Australian families.

We focus on fathers' work time for two reasons. First, fathers' long hours on the job and lack of equal involvement in child care are powerful drivers of gender inequality in the home and the labor market, underlying gender gaps in participation and pay (Cha, 2010; Cha & Weeden, 2014; Jacobs & Gerson, 2004). Understanding the consequences of fathers' time allocation and commitments, as reflected in children's experience and views, adds an important dimension to the debate on working time, gender, and equality, which has almost entirely focused on adults' points of view. This omission neglects children's voices and rights and renders invisible their stake in how economies, societies, gender relations, and care are structured. It is therefore important to include children's voice in the evidence, acknowledging their centrality to the problem of work and care and their unique perspective (Corsaro, 2005; Polatnick, 2002). Second, public policy has typically viewed fathers' work time as unproblematic for themselves or their children; family friendliness, for example, reflects policies and practices that usually target mothers' work time (father-focused policies generally concentrate on leave; e.g., O'Brien, Brandth, & Kvande, 2007). This is surprising because there is more than a decade of scholarly research documenting new expectations for fathering. Employed fathers can experience work–family conflicts at rates comparable to or greater than those of employed mothers (Milkie, Kendig, Nomaguchi, & Denny, 2010; Tang & Cousins, 2005). Indeed some scholars argue that contemporary fathers have developed a "temporal conscience" centering on time–or a lack thereof–with their children (Daly, 1996, p. 469).

We therefore suspect that in countries such as Australia, many fathers are facing powerful work–care dilemmas that are salient to their children. We link children's reports back to their fathers' job and work time imperatives to understand, through children's experiences, the way the workplace may be shaping contemporary fathering. To date, much of the research on children's views has been qualitative, yielding rich insights and underscoring the different viewpoints children may have, yet this research does not connect such experiences to structural processes in labor markets. Little research has tested the way the requirements of fathers' jobs are shaping family time through children's eyes. We further extend theory and work–family scholarship by considering multiple dimensions of time, not only the number of hours. As well as long work hours (especially a problem for privileged fathers), we consider a wider range of work time conditions characteristic of contemporary jobs. Working on evenings, nights, or weekends is commonplace given the global exchange of services, and work intensification is widely reported, driven by new technologies and competition for jobs, whereas the ability to change start and stop times is an entitlement available only to select groups of men and is rarely used (Williams et al., 2013). Similar to work hours, these other dimensions of work time are neither fixed nor a given, but subject to wider social, economic, and political imperatives. As Ferree (2010) argues, the work–care nexus in families is simultaneously a site that shapes how children are raised and how gender and power relations are produced. By connecting theory on fathers' work time devotions (Williams et al., 2013) with sociological analysis of contemporary fathering and children's agency (e.g., Corsaro, 2005; Daly, 1996), our study seeks to show this nexus from the perspectives of children and fathers.

Fathers' Work Time: Devotions and Dimensions

Jobs vary in how their time imperatives operate, but in competitive labor markets typical of liberal market economies, they can be roughly grouped into two. There are "good" jobs that deliver high pay and privilege, and they usually include some control over time, so the hours tend to be more flexible. However, they also require long hours and high effort. These jobs are characterized by intense time pressure, with employees expected to work fast, managing multiple demands and extending hours to get the job done (Williams et al., 2013). Career success, and in some instances holding onto a good job, reflects a tournament that aligns with long hours and high effort imperatives, but career tournaments also occur in lower paid, lower status jobs (O'Neill & O'Reilly, 2010). In these jobs, success and security does not typically center on how long or how intensively fathers work, but the contest is over availability and when they work (Williams et al., 2013). Although (somewhat) shorter hours might free up time for caregiving, a lack of predictability

and working on evenings, nights, or weekends clash with the times children are present. Furthermore, these schedules have start and stop times that are rarely flexible, generating family time conflicts and making reliable caregiving more difficult (Chatzitheochari & Arber, 2012).

Prioritizing more time to care, be it by reducing work hours, refusing shifts, or asking for time off, signals a loss of devotion to the workplace (Coltrane, Miller, De Haan, & Stewart, 2013). Unlike mothers, fathers are viewed as workers who are unhampered by competing loyalties, and this enables fathers to receive privileges (monetary and success) because of their gender, but only so long as they give work time—not care—ascendency. This generates a powerful time bind that many are reluctant to confront, and thus few fathers use family-friendly provisions even when they are legally entitled to do so. The onus shifts to mothers to cut back, reinforcing gender divisions of care in the family and success in the labor market (Cha, 2010; Maume, 2006), raising questions about what children make of fathers' work and family time.

The theory from Williams et al. (2013) helps explain why fathers' work hours have remained consistent, even while mothers' labor force participation has risen. It may also illuminate why more fathers than mothers say work conflicts with time for family (Australian Bureau of Statistics, 2013). In Australia, where our study is set, the vast majority of fathers work full-time, many long full-time (more than 50 hours each week), irrespective of their children's age or their partner's employment (Charlesworth, Strazdins, O'Brien, & Sims, 2011). Such rigidity in fathers' work time is explained by the analysis in Williams et al. (2013): If fathers are penalized when they reduce their work time investments, but are seeking to be more engaged at home, they may not change how they work even if they experience more conflict.

Fathers' work time is more than hours and minutes, however, and this is also apparent in the theory of work devotion in Williams et al. (2013). Work time involves multiple dimensions that include scheduling (working on weekends, evenings, and nights), intensity (working fast, deadlines, and under time pressure), and flexibility (fathers' capacity to control start and stop times), which may be as important to children as the number of hours fathers work. Evidence for this is drawn from studies of fathers' time use. In Australia, similar to many countries, most direct father–child interaction happens on weekends (Baxter, 2015; Pocock & Clarke, 2005; Yeung, Sandberg, Davis-Kean, & Hoferth, 2001), and when work intrudes into weekends fathers generally cannot recover this time with children (Hook, 2012). Work intensity, which refers to pace and time pressure, may be especially important to fathers' engagement and the quality of time with children. Diary studies show that time pressures on the job generate emotional states (e.g., anger, distress, and fatigue) that alter fathers' mood and energy when at home, and these can transfer into interactions with children (Repetti, 1994). Finally, the capacity to control when work is done (flexibility) enables fathers to adjust time to child-related needs, responsibilities, and events. Being unable to attend special events, respond to unexpected care needs, or contribute to some daily routines makes this aspect of work time highly visible and directly consequential to children. Thus, a developed body of theory and evidence shows, from the adult perspective, how work time affects fathers' family time and capacity to care. A key gap has been to connect adult-focused insights into contemporary work, time, and gender to what children think and experience.

Discerning Concerns: Children's Views of Fathers' Work and Time

It might be expected that children would naturally want more time with their father, yet evidence points instead to children's support for fathers' employment. Rather than begrudging their father's job, most children appear to accept fathers' work as necessary and valued (Galinsky, 1999; Harden, Backett-Milburn, MacLean, Cunningham-Burley, & Jamieson, 2013; Lewis, Noden, & Sarre, 2008; Pocock & Clarke, 2005); they understand the importance of being able to earn income and support them. For example, one 9-year-old girl, whose father was struggling to find full employment, explained the following to Galinsky (1999, p. 50): "He has been getting 20 hours a week instead of 40, which has been really hurting his paycheck. When he doesn't get his full paycheck, it makes him feel bad. It makes him feel like he is not doing enough for his family." Sometimes fathers can be viewed unidimensionally as "the money guy" (Brannen, Wigfall, & Mooney, 2012, p. 33), but most research indicates that children and

adolescents hold a mixture of feelings about father's jobs: They value his employment and accept it imposes time constraints while valuing time together as special and unique. Similar to fathers, the majority of children in these studies struggle with the necessary tensions and trade-offs between earning income and time. Children's pragmatism in resolving this tension is apparent in Pocock and Clarke's (2005) interviews with adolescents who come from high- and low-income families: In high-income families, they opted for more time, not more money, but in less well-off households, money and time trade-offs were carefully weighed. Although many adolescents still opted for more time with fathers, they were aware of what this might mean for family finances: "I really can't pick, because we need the money, but I also need my parents" (16-year-old from a low-income family; Pocock & Clarke, 2005, p. 66).

Thus, children and young people do not view fathers' employment as either intrinsically good or bad (Pocock & Clarke, 2005), and they may to some extent view fathers' lack of time with them as normative (Sinno & Killen, 2011). This may not change their desire to spend time together, however, even while they understand it: "I miss him. He's gone for short times. He calls from where he is. I'd rather have him home during that time, but I know he has to do it because it's part of his job" (12-year-old girl; Galinsky, 1999, p. 67). Children appear to place special value on certain times with their father, often the weekends, suggesting that fathers' work on weekends may disrupt children's acceptance of work ascendancy: "He leaves on Monday and comes home on Friday, which is annoying. He spends time with us on the weekends, so he is making up for it" (12-year-old boy; Brannen et al., 2012, p. 31). Furthermore, the studies reveal that children consistently dislike rushing, which they link to fathers' work stresses, intensification, inflexibility, and the feeling that work is put first (Brannen et al., 2012; Galinsky, 1999). Some children described fathers who came home from work in foul moods, tired, aggravated, or grouchy from their work efforts, which they responded to by keeping out of his way, trying to help, being "good," feeling anxious, or simply accepting (Brannen et al., 2012; Harden et al., 2013; Pocock & Clarke, 2005). Avoiding rushing was another reason why weekend time (which was usually less pressured and constrained) was highly valued (Galinsky, 1999; Harden et al., 2013).

These rich interview data reveal that children are far from being passive objects of fathers' work–time dilemmas, but actively construe, engage with, and sometimes even ameliorate them. Even so, their relationship with their father and time with him was valued, reinforcing the theory on the centrality of the father–child relationship to child development (Lamb, 2010). A strength of the research to date is the nuanced accounts and clear evidence that fathers' time at work and at home is important and visible to children. It is, however, likely to be erroneous to assume that children always concur with adult (fathers') views, although few studies directly compare both perspectives. Even fewer studies systematically link children's concerns about and views of time with fathers to the features of his job and to father–child relationships.

As well as children's pragmatism and longing, our review also reveals that multiple dimensions of work time are salient to children, suggesting that they independently influence how children construe fathers' care. Yet we found that few studies—qualitative or quantitative—directly connect children's views and experiences of fathering to those aspects of work time theorized as problematic (Williams et al., 2013). Our expectation is that fathers' hours, schedules, intensity, and flexibility will play a role in shaping children's views and experience of fathering; investigating this is a core aim of the article.

Does Father's Time Matter More to Some Children, in Some Families?

Although our review reveals that children generally accept and value their fathers' work efforts and understand the countervailing commitments he has, they also view their time with fathers as special and unique. The acceptance of fathers' work time was not universal, and just as some fathers reported concerns about a lack of time together, so did some children (Lewis et al., 2008; Pocock & Clarke, 2005). Along with fathers' work time devotions (assessed by hours, schedules, intensity, flexibility), children's age may also determine how they value and view their father's time. Older children appear to value their time alone and so are more likely to see time apart as a marker of independence. As adolescents (aged 14–15 years) explained to Lewis

et al. (2008), they liked time alone because they disliked parents talking with them, at their age it was not really "their thing" (Lewis et al., 2008, p. 434). Younger children have different attachment needs and may be more likely to mention missing their fathers, such as feeling annoyed if fathers were late home, and this may affect their experience of closeness (Brannen et al., 2012; Galinsky, 1999).

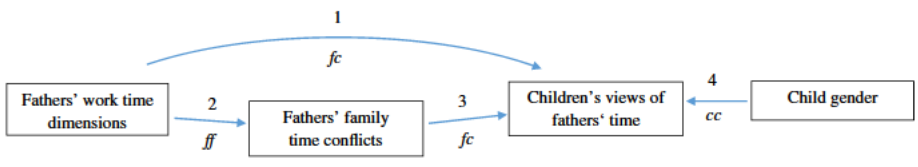
It is also possible that a child's gender will affect views about a father's time. Fathers are usually more involved with sons (Yeung et al., 2001), and their time together centers on doing "boys things" (Brannen et al., 2012, p. 32). This suggests that impingements on fathers' time may be especially salient to boys. A recent longitudinal study revealed that fathers' long work hours were detrimental to sons', but not daughters', mental health, further suggestive of this possibility (Johnson, Li, Kendall, & Strazdins, 2014). Although most studies find that fathers' involvement is important for all children, the benefits appear to be most marked among boys (Marsiglio, Amato, Day, & Lamb, 2000). Age and gender differences might interact; thus Galinsky (1999) found that the boys she interviewed appeared to especially miss time with their fathers, especially older boys aged 16 or 17 years. Just as there may be age- and gender-linked pathways between fathers' time and children's health (Johnson et al., 2014; Lamb, 2010; Sallinen, Kinnunen, & Rönkä, 2004), so too there may be gender- and age-linked influences on how children view and experience their fathers' work time and time with them.

Fathers' education and income are important to control for in the model because the time requirements associated with fathers' jobs vary according to pay and skill levels (Williams et al., 2013). As well as influencing which jobs fathers have (and their associated time requirements), education can independently shape the father–child relationship. For example, highly educated fathers tend to spend more time with their children and are more involved in activities such as homework (e.g., Yeung et al., 2001). Mothers' work hours may also determine how children value and view their fathers' time. Although children generally describe their time with fathers as special and unique (and not replaceable by mothers), they also appear to hold gender-normative beliefs, whereby mothers are expected to do more caregiving (Sinno & Killen, 2011). It is possible that when mothers are employed, such gender-normative beliefs are loosened and a reliance on fathers' time increases, both for the day-to-day caregiving and for fun. Impingements on the time together may therefore be more salient and less accepted in families where mothers are also devoting time to paid work, increasing their relative influence on children's views and wishes. Finally, our model adjusts for the nature of the fathering relationship (step or biological) and the number of children in the family, which could further constrain fathers' time and availability.

Research Hypotheses

Our conceptual model is illustrated in Figure 1. Using paired data from fathers and children, we propose that fathers' work time requirements and family time conflicts (as reported by fathers) shape how children view father's time. Following the analysis by Williams et al. (2013), fathers' family time conflicts occur via multiple dimensions of fathers' work time (not just work hours). Our model then connects these adult pathways (1, 2, and 3) to how children view their fathers' work and family time (path 4) to establish if they influence how children view fathers' jobs (works too much, wish he didn't work at all) and time with them (enjoy time, have enough time together). Specifically, we expect that when fathers work long hours,

Figure 1. Conceptual Model of Direct and Indirect Influence of Fathers' Work Time on Children's Views.



Note. 1, 2, 3, and 4 are the hypothesized associations. *ff* = father data, *fc* = father and child data, *cc* = child data.

work at unsociable times, work under time pressure, and have a lack control over work time, this puts pressure on time the children value, and they are more likely to develop negative views about his work and time with them (Hypothesis 1). They also generate conflicts in family time (Hypothesis 2) because fathers miss family events, and their time at home is pressured and less fun. Although children may form their viewpoints independently, we expect (Hypothesis 3) that fathers' experience of family time conflicts further adds to children's negative views of his time, forming an indirect pathway between fathers' work time and children's views. Because time with fathers may be especially important to boys, we expect (Hypothesis 4) gender differences in children's views. Finally, because time is a defining feature of how relationships with fathers are construed (Daly, 1996), we explore the connection between how children view their father's work and family time and feelings of closeness with him.

Method

Data and Sample

We tested our hypotheses with data from the Growing Up in Australia, Longitudinal Study of Australian Children (LSAC; http://www.growingupinaustralia.gov.au/). The LSAC is a nationally representative study of children, with the main unit of analysis being the study child (Australian Institute of Family Studies, 2003). The sampling frame used the Medicare database, a comprehensive database of Australia's population. Children born within specific dates were randomly selected based on a stratified random sample of Australian postcodes. The families of selected children were then invited to participate (Wave 1 response rate, 54% of these families), yielding a sample of 4,983 children born between March 1999 and February 2000 (the "K cohort"). Our study used survey data collected in 2010 (Wave 4) and 2012 (Wave 5), when these children were aged 10 to 11 and 12 to 13 years. As a proportion of the Wave 1 sample, 84% had been retained at Wave 4 and 79% at Wave 5. All univariate and bivariate analyses used sample weights to adjust for biases from initial nonresponse and attrition.

An important strength of the LSAC is the collection of data from multiple informants, providing the opportunity to pair father and child data. Mothers and fathers completed a separate section on employment and work–family experiences, and an interview with the child's primary caregiver (usually mothers) collected information on family and child demographics. Children completed a computer-assisted self-interview, which included questions about their father's job, family relationships, and time with their father (three of the measures used were repeated in both Waves 4 and 5, and one was available in Wave 5 only). Almost all children (98%) completed this interview.

Of the 4,169 families interviewed at Wave 4 and 3,956 at Wave 5, some were not in scope because we restricted the sample to fathers who were living in the same household as the child, fathers who had worked for pay in the previous week, and fathers whose child had also reported them as employed. Restricting in this way meant excluding 1,376 children without a resident father. We also excluded 423 children with both a resident and nonresident father because we could not be sure to which father the child was referring. Another 386 families with not-employed fathers were excluded, along with 229 families where the child did not answer questions about his or her father's employment or who reported that his or her father was not employed. These exclusions left a possible sample of paired father–child responses of 2,974 at Wave 4 and 2,737 at Wave 5, giving a pooled sample of 5,711 observations. Of these, 5,116 corresponded to the data of each of the two waves for 2,558 children. Another 416 father–child pairs were for Wave 4 only and 179 for Wave 5 only.

Some items were drawn from fathers' self-completion questionnaire, and this component of the study was not available for 22% of the fathers. There were also missing data on some other demographic and work variables. In total, of our in-scope sample, 32% had missing data on one or more variables (see Table 1). Rather than exclude father–child data (which would introduce bias), we used multiple imputation (Acock, 2005; Johnson & Young, 2011). Using Stata (Stata 14.0; StataCorp, 2015), the "MI" command chained equations generated 25 imputation data sets based on all analytical variables and additional demographic variables (marital status, English-language proficiency, and parental relationship quality) that might affect nonresponse. All multivariate analyses were based on the imputed data.

Table 1. *Descriptive Statistics, Pooled Wave 4 and Wave 5 Data*

		Weighted % *M* (*SD*)	Nonmissing *N* (imputed *N*)
	Children's views of fathers' time		
Fathers' work	He works too much	35.3	5,707 (4)
	Wish he didn't work	17.4	5,708 (3)
Time together	Enjoy time together	68.4	5,706 (5)
	Enough time together (Wave 5 only)	65.6	2,722 (15)
	Fathers' work time dimensions and family time conflicts		
Hours	Part time <35 hours	11.7	5,711
	35–44 hours	40.8	–
	45–54 hours	26.0	–
	≥55 hours	21.5	–
Schedule	Daytime, weekdays only	57.2	5,711
	Daytime, including weekends	24.6	–
	Nights, evenings, rotating, shifts	18.1	–
Intensity	Agree or strongly agree	38.6	4,336 (1,375)
Flexibility	Cannot change or need approval	37.5	4,313 (1,398)
Fathers' family time conflicts	Misses family events	55.9	4,333 (1,378)
	Pressured family time	20.3	4,338 (1,373)
	Child and family characteristics		
Child gender	Boy	50.9	5,711
Child age	10–11 years	52.1	5,711
	12–13 years	47.9	
Father–child relationship	Biological father	99.4	5,711
	Stepfather	0.6	
Single father	Single father	1.5	5,711
Mothers' employment and work hours	Not employed or <15 hours per week	35.0	
	Employed ≥15 hours per week	63.5	
Family size	Number of children in family	2.61 (0.98)	5,711
Fathers' age	Years	44.6 (5.6)	5,711
Fathers' education	Incomplete secondary (<12 years)	12.1	5,684 (27)
	Complete secondary (≥12 years)	53.7	
	Bachelor's degree or higher	34.2	
Fathers' income	Weekly gross (2012 AUD)	1,796 (1,497)	5,153 (558)

Note. Total *N* in analytical sample = 5,711 for pooled data and 2,737 for Wave 5 only. AUD = Australian dollars. Descriptive statistics were calculated from the weighted, unimputed data.

Measures

Descriptive statistics for all measures are shown in Table 1, which includes information about the degree to which variables were imputed as a result of missing data.

Dependent Variables.
Children's views of fathers' time. There were four child-reported outcomes. Three were asked in Waves 4 and 5, whereas a fourth was introduced in Wave 5. For each, items were dichotomized (percentages refer to weighted distributions, pooled Waves 4–5 for the first three items).

Works too much? In both Waves 4 and 5, children were asked, "Do you think your dad works too much, too little, or about the right amount?" Response categories were "too much" (35%), "about the right amount" (63%), and "too little" (2%). A binary variable compared "too much" with the other responses.

Wish he didn't work? Similarly, at both waves, the children were asked, "Do you wish your dad

did not have to work?" Response categories were "yes, wish very much" (17%), "yes, wish a little bit" (40%), and "don't wish, not a problem" (42%). A binary variable compared "yes, wish very much" with the other categories. These two measures were adapted from Galinsky (1999).

Enjoy time together. At both waves, the children also responded to the question "Do you enjoy spending time with your dad?" using the following three response categories: "definitely true" (68%), "mostly true" (28%), "mostly not true" (3%), and "definitely not true" (1%). Given that almost all of the children reported positively on this, the binary variable compared "definitely true" with any other response.

Enough time together? At Wave 5, a new item asked the following: "Do you think the amount of time your dad spends with you is enough, too much or not enough?" The children's response categories were "nowhere near enough" (7%), "not quite enough" (27%), "about right" (63%), "a little too much" (2%), and "way too much" (1%). The binary version compared "nowhere near enough" and "not quite enough" with other categories (for a description, see the Baxter & Strazdins, LSAC Annual Statistical Report, 2014). Additional analyses explored how these views were related to children's assessments of closeness with their fathers. We used two items to assess closeness, "How close do you feel to your dad?" "very close" (54%), "quite close" (38%), or "not very close or not close at all" (8%), which we dichotomized as "very close" versus the rest in Wave 5, and "If you had a problem would you talk to your dad?" "yes" (68%) or "no" (31%), in Waves 4 and 5.

Independent Variables.

Fathers' work time. We predicted children's views using fathers' data on work time and family time conflicts, available in Waves 4 and 5.

Weekly hours. Fathers' usual weekly work hours were categorized into bands to classify very long work hours (≥55 hours), long hours (45–54 hours), and standard full-time (35–44 hours) or part-time hours (<35 hours).

Work schedules. Fathers' regular work schedules were classified as "regularly works days–only weekdays," "regularly works days–including weekends," and "night, evening, rotating or other shift."

Work time intensity. Fathers rated their agreement with the statement "I never have enough time to get everything done in my job" and were classified as time pressured if they answered "agree" or "strongly agree" as opposed to "neither agree nor disagree," "disagree," or "strongly disagree."

Flexible hours. Fathers were asked "If you sometimes need to change the time when you start or finish your workday, is it possible?" "Yes, I am able to work flexible hours" was classified as flexible, compared with "yes, with approval in special situations," "no, not likely," and "no, definitely not."

Fathers' family time conflicts. Family time conflicts were measured with two items, reported by fathers, in Waves 4 and 5. These items were adapted from the measure developed by Marshall and Barnett (1993).

Misses family events. Fathers who answered "agree" or "strongly agree" to the statement "Because of my work responsibilities, I have missed out on home or family activities that I would like to have taken part in," compared with those who "neither agree nor disagree," "disagree" or "strongly disagree" were coded 1, misses family events. "Because of my work responsibilities, my family time is less enjoyable and more pressured," were considered to have pressured family time when compared with other categories.

Moderating Variables. We expected that time with fathers would matter more for younger children and for boys. Preliminary analyses indicated a significant Child Gender × Age interaction in children's views about fathers' work and time together, so we included a categorical variable (classifying children by age and gender) in all models and also tested for child age and gender interactions with work time.

Control Variables. We adjusted for fathers' education, fathers' income, the relationship between fathers and children (step vs. biological), and number of children in the household. We compared single-father families to couple families, which were further disaggregated according to whether mothers were in paid work for more than 15 hours per week (maternal work hours).

Statistical Approach

Bivariate analyses explored the unadjusted associations between key variables in the model

Table 2. *Father's Work Time Characteristics and Family Time Conflicts, by Children's Views of Fathers' Time, and Fathers' Work Time Characteristics by Fathers' Family Time Conflicts (Unadjusted Percentages)*

	Children's views of fathers' time, %				Father's family time conflicts, %	
	Works too much	Wish he didn't work	Enjoy time together	Enough time together	Misses family events	Pressured family time
Fathers' work time dimension						
Hours	***	†	***	***	***	***
< 35 hours	22.1	12.7	59.8	71.6	38.4	16.4
35–44 hours	28.7	17.2	66.9	68.7	48.8	15.2
45–54 hours	38.6	17.5	71.1	66.7	59.0	22.1
≥ 55 hours	48.7	19.3	70.6	56.1	72.6	30.0
Schedule	***	***	n.s.	*	***	***
Daytime (not weekends)	30.6	15.5	69.2	67.6	49.7	18.2
Daytime (including weekends)	40.5	20.0	66.4	63.7	62.0	25.4
Night, evening, rotating, shifts	42.5	19.9	68.4	61.8	68.1	20.4
Intensity	***	†	n.s.	**	***	***
Agree, strongly agree	39.3	18.6	69.5	61.1	70.0	33.3
Neutral to strongly disagree	31.0	16.3	69.6	68.9	47.5	12.5
Flexibility	n.s.	***	n.s.	†	***	***
Can change work hours	33.3	15.0	69.9	68.2	50.9	18.5
Cannot change, must seek approval	35.5	20.3	69.2	62.0	63.6	22.8
Fathers' family time conflicts						
Misses out on family events	***	***	n.s.	***	–	–
Agree, strongly agree	40.3	19.2	69.2	62.2	–	–
Neutral to strongly disagree	26.2	14.7	70.0	70.8	–	–
Family time is pressured	***	†	*	***	–	–
Agree, strongly agree	43.7	18.6	65.5	58.4	–	–
Neutral to strongly disagree	31.6	16.8	70.6	67.9	–	–
Total	35.3	17.4	68.4	65.6	55.9	20.3

Note. Weighted estimates, derived from unimputed data. For each indicator based on child reports and each work time conflict indicator based on fathers reports, percentages were compared within each of the categorical variables, with statistical significance of differences tested using Chi-square statistics. n.s. = not statistically significant ($p \geq .10$).

$^{\dagger}p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

in Figure 1 using father- and child-reported data (Table 2). These analyses examined which work time characteristics were associated with fathers' family time conflicts and if children's views about fathers' work and family time were associated with his work time characteristics and family time conflicts. Logistic regression modeling then tested the hypotheses after adjusting for control variables and child gender and age interactions. Table 3 reports the adjusted association between fathers' work time characteristics and family time conflicts. Table 4 presents adjusted direct and indirect associations between children's views and fathers' work time characteristics and family time conflict. Analyses used Stata/MP 14.0 (StataCorp, 2015). We calculated robust standard errors to take into account the nonindependence of observations from the same child.

We modeled each of the child outcomes separately, testing for direct and indirect associations in two steps. Step 1 modeled the adjusted association between the child-reported outcome and fathers' work time, along with the control variables. Step 2 added fathers' family time conflicts. A reduction in the size of the associations is an indication that the father's family time conflicts were an indirect path linking his work time requirements to his children's views. Stata's KHB routine tested whether the indirect effect was significant, using an approach developed by Breen, Karlson, and Holm (2013)

Table 3. *Adjusted (Unstandardized) Coefficients and Odds for Children's Views of Fathers' Time*

	Children's views							
	Works too much		Wish he didn't work		Enjoy time together		Enough time together	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
Fathers' work time dimensions								
Hours (ref. 35–44)								
< 35 hours	−0.39**	−0.36*	−0.31†	−0.29	−0.23†	−0.23†	0.17	0.15
	(0.67)	(0.70)	(0.73)	(0.75)	(0.79)	(0.79)	(1.18)	(1.16)
45–54 hours	0.35***	0.32***	−0.00	−0.02	0.15*	0.17*	−0.04	−0.02
	(1.41)	(1.37)	(1.00)	(0.98)	(1.17)	(1.18)	(0.96)	(0.98)
≥ 55 hours	0.66***	0.58***	0.02	−0.01	0.18*	0.21*	−0.43***	−0.39***
	(1.93)	(1.79)	(1.02)	(0.99)	(1.20)	(1.23)	(0.65)	(0.67)
Schedule (ref. daytime, weekday)								
Daytime including weekends	0.21**	0.18*	0.21*	0.20*	−0.18*	−0.18*	−0.05	−0.03
	(1.23)	(1.20)	(1.24)	(1.22)	(0.83)	(0.84)	(0.96)	(0.97)
Night, evening, rotating, shifts	0.42***	0.36***	0.24*	0.20†	−0.04	−0.03	−0.13	−0.10
	(1.52)	(1.44)	(1.27)	(1.22)	(0.96)	(0.97)	(0.88)	(0.90)
Intensity (ref. low)	0.26***	0.13†	0.22*	0.18†	−0.04	0.01	−0.26**	−0.18†
	(1.29)	(1.14)	(1.25)	(1.20)	(0.96)	(1.01)	(0.77)	(0.83)
Flexibility (ref. inflexible)	−0.12†	−0.04	−0.31***	−0.27**	−0.02	−0.05	0.22*	0.18†
	(0.89)	(0.96)	(0.73)	(0.76)	(0.98)	(0.95)	(1.25)	(1.20)
Fathers' family time conflicts								
Misses family events (ref. disagree)		0.40***		0.28**		−0.01		−0.17
		(1.49)		(1.32)		(0.99)		(0.84)
Pressured family time (ref. disagree)		0.25**		−0.05		−0.25**		−0.19
		(1.29)		(0.95)		(0.78)		(0.83)
Child gender and age								
Girl aged 10–11 (ref. boy 12–13)	−0.16*	−0.15†	0.08	0.09	0.41***	0.40***	–	–
	(0.85)	(0.86)	(1.09)	(1.09)	(1.50)	(1.50)	–	–
Girl aged 12–13	−0.06	−0.05	−0.53***	−0.53***	0.03	0.03	−0.31***	−0.31***
	(0.94)	(0.95)	(0.59)	(0.59)	(1.03)	(1.03)	(0.74)	(0.73)
Boy aged 10–11	0.02	0.02	0.51***	0.51***	0.18**	0.19**	–	–
	(1.02)	(1.02)	(1.67)	(1.67)	(1.20)	(1.21)	–	–
Control variables								
Stepfather (ref. biological father)	0.11	0.14	−0.12	−0.07	−1.06**	−1.04**	0.34	0.32
	(1.12)	(1.15)	(0.89)	(0.93)	(0.35)	(0.35)	(1.40)	(1.38)
Single father (ref. not-employed mother)	0.09	0.11	−0.04	−0.03	0.70*	0.70*	0.31	0.30
	(1.09)	(1.12)	(0.97)	(0.97)	(2.02)	(2.02)	(1.36)	(1.35)
Employed mother (ref. not employed)	0.16†	0.18*	−0.02	−0.02	0.09	0.08	0.13	0.12
	(1.17)	(1.19)	(0.98)	(0.98)	(1.10)	(1.09)	(1.14)	(1.13)
Family size	−0.01	−0.02	0.01	0.01	−0.05	−0.05	0.07	0.07
	(0.99)	(0.98)	(1.01)	(1.01)	(0.95)	(0.95)	(1.07)	(1.07)
Fathers' income	0.09*	0.07	−0.01	−0.03	0.14**	0.14**	0.00	0.01
	(1.10)	(1.07)	(0.99)	(0.97)	(1.15)	(1.15)	(1.00)	(1.01)
Square of fathers' income	−0.00	−0.00	0.00	0.00	−0.01**	−0.01**	−0.00	−0.00
	(1.00)	(1.00)	(1.00)	(1.00)	(0.99)	(0.99)	(1.00)	(1.00)
Completed secondary (ref. incomplete)	−0.07	−0.08	−0.11	−0.12	−0.08	−0.07	0.11	0.12
	(0.93)	(0.92)	(0.89)	(0.89)	(0.92)	(0.93)	(1.11)	(1.12)
Bachelor degree or higher	−0.19†	−0.19†	−0.38**	−0.38**	−0.11	−0.10	0.19	0.20
	(0.83)	(0.82)	(0.68)	(0.68)	(0.90)	(0.90)	(1.21)	(1.22)
Constant	−1.11***	−1.32***	−1.46***	−1.56***	0.61***	0.66***	0.49*	0.60*
	(−0.07)	(−0.08)	(−0.11)	(−0.12)	(−0.08)	(−0.07)	(0.11)	(0.12)

Note. Unstandardized coefficients are presented with odds ratios in parentheses. Models were estimated using imputed data. Robust standard errors were calculated to take account of multiple records per child. $N = 5{,}711$ for "works too much," "wish he didn't work," and "enjoy time together" models. $N = 2{,}736$ for "enough time together" model. ref. = reference.

$^{\dagger}p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Table 4. *Adjusted (Unstandardized) Coefficients and Odds for Fathers' Family Time Conflicts by Work Time*

	Fathers' family time conflicts	
	Misses family events	Pressured family time
Fathers' work time dimensions		
Hours (ref. 35–44)		
< 35 hours	−0.42** (0.65)	−0.03 (0.97)
45–54 hours	0.25** (1.28)	0.30** (1.35)
≥ 55 hours	0.68*** (1.97)	0.60*** (1.83)
Schedule (ref. daytime, weekdays)		
Daytime, including weekends	0.26** (1.30)	0.14 (1.15)
Nights, evenings, rotating, shifts	0.70*** (2.00)	0.09 (1.09)
Intensity (ref. low)	0.93*** (2.53)	1.26*** (3.53)
Flexibility (ref. inflexible)	−0.69*** (0.50)	−0.55*** (0.58)
Control variables		
Family size	0.08† (1.08)	−0.05 (0.96)
Stepfather (ref. biological father)	−0.72 (0.49)	0.60 (1.82)
Single father (ref. not-employed mother)	−0.21 (0.81)	0.04 (1.04)
Working mother (ref. not-employed mother)	−0.11 (0.90)	−0.22* (0.81)
Fathers' income	0.29*** (1.34)	−0.01 (0.99)
Square of fathers' income	−0.01*** (0.99)	0.00 (1.00)
Complete secondary (ref. incomplete secondary)	0.08 (1.08)	0.21 (1.23)
Bachelor degree or higher (ref. incomplete secondary)	−0.02 (0.98)	0.17 (1.18)
Constant	−0.51* (0.60)	−1.78*** (0.17)

Note. Unstandardized coefficients are presented along with odds ratio in parentheses. Models were estimated using imputed data. Robust standard errors were calculated to take account of multiple records per father $N = 5{,}711$. Models also included control variables for age and gender of study child. ref. = reference.

†$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

to decompose effects in nonlinear models into direct and indirect effects, once proposed pathway variables were entered into the model. This routine could only be applied to the unimputed data; however, we believe this was not a significant problem because our sensitivity tests comparing findings for imputed and unimputed data in our other models yielded few differences. We also computed interaction terms for child gender and child age with fathers' work time variables.

Results

Table 1 describes the sociodemographic characteristics of our sample using weighted averages from pooled data. About one third of children considered that their father works too much, and less than one fifth wished he did not work at all. Two thirds of the children said that they enjoyed and had enough time with their father, respectively. Most (9 of 10) fathers worked full-time (national average for fathers, 85%; Australian Bureau of Statistics, 2006), and nearly one fifth worked very long hours. One quarter of the fathers regularly worked weekends, and a further fifth on evenings, nights, irregular, or rotating schedules. Nearly two in five fathers worked under time pressure, and more than a third could not change start or stop times or needed approval to do so. One half of fathers missed out on family events, and about one fifth described their family time as more pressured and less fun because of their jobs.

Unadjusted Associations

Both children's views of fathers' time and fathers' family time conflicts were associated with multiple dimensions of work time, providing preliminary support for the hypotheses (Table 2). As fathers' weekly work hours increased, so did the proportion of children who considered that he worked too much or wished he did not work at all (the latter trend was marginal) as well as the proportion of fathers who missed out on family events or whose family time was pressured. Similarly, as fathers' hours increased, the proportion of

children saying that they had enough time together decreased, although the children were also more likely to say that they definitely enjoyed time with their fathers. Fathers' work schedules were associated with both child and father views of his job. Proportionally fewer children thought that their father worked too much or wished he did not work at all when he usually worked daytime, weekday hours, and proportionally more considered that they had enough time together. Similarly, proportionally fewer fathers missed out on family events or described pressured family time when schedules were daytime and did not include weekends. When fathers worked under time pressure (work intensity), higher proportions of children considered that he worked too much compared to when fathers did not, there was also a marginal increase in the proportion wishing he did not work at all and a lower proportion saying that they had enough time with their father. Work time pressure was also associated with higher proportions of fathers missing out on family events and having pressured family time. When fathers could change their work hours (flexible hours), proportionally fewer children wished he did not work at all and considered that they had enough time together. These fathers were also less likely to miss out on family events or experience pressured family time.

Adjusted Models

Adjusted results, presented in Tables 3 and 4, showed similar, consistent patterns of associations supporting our hypotheses that children's views about fathers' work and time with them were linked to multiple dimensions of his work time.

> Hypothesis 1: Children view fathers' time (at work, with them) negatively when he works long hours, at unsociable times, under time pressure, or lacks control over when he works.

Although multiple dimensions of fathers' work time influenced children's views, the patterning of associations varied for particular viewpoints (see Table 3). All dimensions of fathers' work time, long weekly work hours and working on weekends, evenings, nights, and on shifts as well as working under time pressure and having little capacity to vary start and stop times, were independently associated with the children's views that their fathers worked too much. However, work hours were unrelated to children wishing that their fathers did not work at all. What appeared to be more important was when fathers worked (weekends, evenings, nights, or shifts), his work time pressure and intensity, and whether he had flexible hours. Children were more likely to enjoy time with their fathers (perhaps surprisingly) when he worked longer hours, but were less likely to enjoy time together when he worked weekends. Very long work hours, working under time pressure, and being unable to vary work hours all increased the likelihood that the children would report that they did not have enough time with their fathers.

> Hypothesis 2: Fathers' family time becomes more conflicted when he works long hours, at unsociable times and under time pressure or lacks control over when he works.

As summarized in Table 4, multiple dimensions of work time were associated with fathers' family time conflict. Working more than 44 hours each week; working on weekends, evenings, nights, or shifts; working under time pressure; and difficulty in varying start and stop time were independently associated with fathers missing family events. Work schedules did not appear to influence the quality of fathers' family time (pressured, less fun); however, long work hours, intensity, and inflexibility made independent contributions.

> Hypothesis 3: Fathers' experience of family time conflicts contributes to children's negative views, forming an indirect pathway linking fathers' work time and children's views.

We tested this hypothesis by adding father-reported family time conflict measures into the models after adjusting for his work time (Step 2, Table 3). We found that children were more likely to view that their father worked too much when their father reported that he missed family events and that family time quality was pressured. Missing family events also influenced children's wish that their father did not work at all. When fathers reported that their family time was more pressured and less fun, their children were also less likely to say that they always enjoyed time together. Fathers' family time conflicts did not influence children's assessment of having enough time with fathers, which

remained significantly associated with fathers' long hours and work intensity. We expected that fathers' family time conflicts would form an indirect pathway between his work time and children's views about his work and his time with them. Despite fathers' work time consistently predicting his family time conflicts (Table 4), we observed very little change in the associations between his work time (hours, schedules, intensity, and flexibility) and children's views with the inclusion of fathers' family time conflicts in the model. There was minor attenuation of the linkages between fathers work intensity and children's view that he worked too much or wish he that did not work at all when fathers' family time conflicts were added to the model. When formally tested for mediation (using KHB on unimputed data), this reduction was not significant ($p = .16$), giving no support for an indirect pathway (results not shown). Contrary to our hypothesized model, the results indicated that fathers' work time dimensions were directly related to children's views about fathers' work and family time.

Hypothesis 4: Do age and gender modify children's views of fathers' time?

We found that when compared with boys aged 12 to 13 years (reference group), younger girls (ages 10–11) were marginally less likely to consider that their father worked too much, and girls aged 12 to 13 years were less likely to wish that their father did not work at all. When boys were younger (ages 10–11), they were more likely to wish that their father did not have to work when compared with 2 years later. Boys and girls aged 10 to 11 years were more likely than the boys aged 12 to 13 to always enjoy time with fathers. Views about having enough time were only collected from 12- and 13-year-olds; in this age group, girls were less likely than boys to say that they had enough father time. There was one age interaction between fathers' work time and children's views. When children were older (ages 12–13, $p < .05$), the association between long work hours and working too much was stronger.

Children's views and father–child closeness. We explored how views about time with fathers were related to the children's assessments of closeness (how close do you feel to your dad; if you had a problem would you talk to your dad). We found that the children were less likely to describe their relationship as very close when they considered that their father worked too much ($p < .026$) or when they did not enjoy ($p < .001$) or have enough time together ($p < .001$). They were more likely to describe their relationship as very close if they wished he did not work at all. The children were less likely to say that they would go to their father about a problem if they thought he worked too much ($p < .001$, Wave 4; $p < .01$ Wave 5) and if they did not enjoy ($p < .001$ at both ages) or have enough time together ($p < .001$ at both ages). This aspect of closeness was unrelated to wishing fathers did not work.

Other predictors of children's views. A number of the control variables were significant predictors of children's views of fathers' time in the models. Although very few children lived with stepfathers in our sample, they were less likely to report enjoying their time together when compared with children living with biological fathers. Children whose fathers earned higher incomes were more likely to say that they enjoyed time with him. Children whose fathers had higher educational attainment were less likely to wish that he did not have to work or to consider that he worked too much. Mother's employment and work hours did not appear to influence children's views about fathers (we tested for both main and interactive effects), with one exception: The children in couple families were somewhat more likely to consider that their father worked too much when their mother was working 15 hours or more per week, relative to children whose mothers were not employed or who worked less than 15 hours per week. We also explored socioeconomic differences by interacting low income (bottom 33% of fathers' income distribution) with each of the predictor variables and found that some of the interconnections between working time and fathers and children's views strengthened. Thus nonstandard schedules and (father reported) family time pressure showed stronger associations among low compared with higher income fathers. Children of low-earning fathers were also less likely to say that he worked too much if he had flexible hours.

Sensitivity analyses. Random effects models were used as an alternative approach, with findings consistent with those presented, as were analyses conducted on unimputed data. In our

logistic analysis we combined children who "do not wish" and "wish a little" to compare with the more extreme group wishing "very much" their father did not work. We used a multinomial specification to check that our approach did not overlook substantive differences between these three categories (available on request). Very few differences were observed (if fathers were more highly educated, children were more likely to say they "do not wish" rather than "wish a little," consistent with the logistic finding that as fathers' education increases, children are less likely to wish that he did not work; when fathers say that they miss family events, children were more likely to say "wish a little" rather than "do not wish," consistent with logistic regression interpretation). We also compared the two extreme categories (wish a lot vs. do not wish), which slightly strengthened some associations from the logistic models.

Discussion

Even if they want more time with their children, many fathers hold jobs in workplaces that reward their overwork and ready availability, presuming their primary devotion is to their job (Cha & Weeden, 2014; O'Neill & O'Reilly, 2010; Williams et al., 2013). This creates work time imperatives that undercut fathers' capacity to use family-friendly initiatives and engage with their children, generating a tension between what is expected on the job and what is longed for at home (Ball & Daly, 2012; Daly, 1996). Difficulty in resolving these tensions may help explain why fathers often report work and family conflicts; among the Australian fathers we studied, more than half said that they missed out on family events, whereas a fifth said that their jobs made family time more pressured and less fun. Despite this, nearly a half worked longer than 45 hours each week, one quarter usually worked on weekends, two in five worked in jobs characterized by time pressures, and more than a third lacked flexibility in when they started or stopped. We found that these work time requirements not only contributed to fathers' family time conflicts but also they mattered to their children, directly influencing how the children viewed their fathers' work and their time with them.

As existing research shows, most children value fathers' employment and accept that it restricts his time (Brannen et al., 2012; Harden et al., 2013; Lewis et al., 2008). They understand that their fathers' job is important and benefits the family (Galinsky, 1999; Pocock & Clarke, 2005). Consistent with this research, the majority of the 10- to 13-year-old Australian children we surveyed viewed their fathers' work time positively and were content with time together. However, significant numbers were not content. More than one third considered that their father worked too much, one eighth wished that he did not work at all, about one third wanted to have more time with him, and another third reported that they did not always enjoy the time that they had together. We went beyond existing research on children and parents' jobs to assess which aspects of work time are problematic. Using the theory from Williams et al. (2013) on work time devotions, we were able to identify where the work time limits—from the children's point of view—might lie.

Thus we find that multiple aspects of work time pose problems to children's experience of fathering and work, although their significance depends on the outcome (supporting Hypotheses 1 and 2). Although relatively few children wish that their father did not work at all, what appears to generate such a negative view was whether he works weekends, evenings, or nights and if he is unable to vary his worktime, not how many hours he spends at work. This reaffirms other evidence that children imbue certain times with fathers as especially meaningful, such as family meals, routines, and weekends (Harden et al., 2013; Hook, 2012). Not surprisingly, long hours are important to children's view that fathers work too much but so too is when he works. When compared with working standard hours, Monday to Friday, working weekends, evenings, or nights increases the odds of "working too much" in children's minds by 20% to 50%. Fathers' work intensity also increases the odds that children consider he works too much. It is possible that fathers' time stress on the job spills over to affect the quality of time at home; "too much" may refer to a qualitative as well as quantitative constraint on father–child time (Harden et al., 2013; Sallinen et al., 2004).

When fathers work very long work hours, we find that their children are more likely to consider that he is working too much and that they do not have enough time together. They were also more likely to report that they always enjoy time with him. One explanation is that these long-hour fathers do little of the routine, mundane care of children but make special efforts

to spend quality and fun time together (Hook, 2012). Such a possibility may also explain why working on weekends lowers children's odds for saying that they enjoy time with their fathers because these fathers may do more routine weekday care but share less leisure on weekends (Hook, 2012; Yeung et al., 2001). Alternatively, the association we find with fathers' very long hours could reflect an emotional premium children place on the value of scarce time with their father. Overall, our findings reinforce other evidence that children view time with fathers as special and unique, especially their time together on weekends, whereas long hours on weekdays are viewed as part of the job, up to a point. Such findings reinforce the centrality of time with fathers for children (Daly, 1996; Lamb, 2010), but we find it is not only the long hours of high-skilled, well-paid jobs that are problematic for contemporary father–child relationships but also the time requirements of lower status jobs (Williams et al., 2013). Indeed, for the children of low-income fathers, work scheduled on evenings, nights, and weekends and inflexible start or stop times appeared to be especially problematic.

Finally, we expected that children also develop negative views if fathers' family time becomes conflicted (Hypothesis 3), and we used two measures reported by fathers (misses out on events and family time is more pressured and less fun) to test this. These measures reflect fathers' own assessments of his family time conflicts, and although they were associated with children's negative views, they did not explain the linkages to work time. The effects we found were indirect, suggesting that children's views about fathers' work time and its impact on them are formed independently of whether fathers themselves consider their work time to be problematic. Such divergence reinforces the need to incorporate children's own views and voice into the research and the importance of doing so.

Study Strengths and Limitations

We used paired data from fathers and children to reduce the bias and confounding when only one informant is used. Few studies of the work–family interface use multiple informant data, and by doing so we build children's views and perspectives into the analysis. However, the paired data were only available for two waves (one for enough time with fathers), thus a multiwave, random effects analysis could not be conducted. Sensitivity tests with random effects models using two waves revealed findings similar to the results from the cross-sectional analysis; however, the robustness of findings would be strengthened if more waves of data had been available. Similarly, the findings suggest that fathers' time is more important for younger children, especially boys, but we are unable to fully assess this without more data from earlier and later child ages. We make the case that children's views about work and family time is important to father–child relationships, and we find that they are also related to children's views about closeness. However, we did not model other aspects of their relationship directly. Conclusions as to the wider impact on father–child relationships or child outcomes are therefore limited. Finally, although our large sample of families was relatively representative of the Australian context, the generalizability of our findings to other countries is qualified. The influence of work hours, schedules, flexibility, and intensity on fathers' family time conflicts are consistent with those found in other developed countries (Byron, 2005), but different policy supports, gender, and work time regimes could alter how they influence relationships with children.

Contributions to Theory

Our findings underline the importance of fathers and the gendered organization of work time to children. Although family scholarship has recognized the important role fathers play in child development and well-being, fathers' employment has tended to be viewed uncritically (for a critique, see Parke, 2004). Recent fatherhood scholars have articulated a differing perspective, describing the time dilemmas of fathers who want to be more engaged while they hold demanding jobs (Ball & Daly, 2012; Henwood & Procter, 2003). This perspective emphasizes the temporal trade-offs employment provokes for fathers, and we show that children are privy to them. By connecting theory on labor markets, gender relations, and class (Ferree, 2010; Williams et al., 2013) to scholarship on the importance of time for fathering and children (e.g., Daly, 1996), we develop and test a conceptual model, supplying new, robust, population evidence for such links. We show that the same aspects of work time that can complicate fathers' capacity to give care shape how his

children view his job and time with them. Working long hours, being available at times valued by children, working under time stress, or missing family events because of inflexible hours are job devotions expected by many workplaces; our study links them directly to children's own views and experiences of their fathers' job and the time he spends with them.

Second, we find that it is not just the time devotions of well-paid jobs that are generating dilemmas for fathers and their children, as Williams et al. (2013) describe; there are differing time imperatives linked to class that can complicate the capacity of all fathers to give care. Our approach supports the analysis by Williams et al. (2013), which states that market demands on time define power relations at work and consequently social relations in families through multiple ways; duration is one, but scheduling, intensity, and control are also important (see also Adam, 2004, for a sociological analysis of time; Thompson, 1967, for a political economy perspective).

Our third contribution is to show that the same work time processes underpinning gender inequality (Cha, 2010; Cha & Weeden, 2014; O'Neill & O'Reilly, 2010) are visible and meaningful to children. Showing that children's own views about jobs, time, and relationships with fathers are directly associated with his work time builds the case for an intergenerational as well as gendered dimension to the flexibility stigma (Williams et al., 2013). Although further research needs to explore this possibility, such a connection would suggest that a direct socializing process occurs between workplaces and children, and this process is also likely to be gendered. Thus we find that boys were more likely to consider that their fathers work too much, relative to girls, and that younger boys were the most likely to wish that their fathers did not work at all. This may reflect a greater significance for boys of having time with fathers or a greater ambivalence among boys toward working (e.g., see the finding from Johnson et al., 2014, that fathers' work hours affect boys', but not girls', well-being). Such a gendered intergenerational process raises further research questions about how gender identity and inequality are reinforced or disrupted and how the role contemporary work time is playing in this (Ferree, 2010). How will these boys enact fatherhood in later life? Will they struggle with a temporal conscience and be willing to push back against flexibility stigmas?

Conclusion

Time and money are basic resources for family life, and fathering is interlinked with both. Fathers earn money through their attachment to the labor market, and they engage with their children through their time. The significance of what fathers give to children, especially through their time, is recognized and valued by family scholars and practitioners. Fathers need to be, and many want to be, more hands on, especially in the context of mothers' increased engagement in the workforce, yet the problem for fathers is how to do this. Just as fathers' time is valuable to families and children, it is also valuable to the workplace, raising questions about whether and where work time limits can be drawn and what is the most fruitful site of intervention. Fathers gain a gendered privilege from better wages and career progression, but they do this by acceding to workplace expectations at a cost of time for the family. We show that this directly encroaches into children's experiences of fathering, and we find that from the children's viewpoint, there are limits to what are acceptable work devotions.

Note

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OVERWORK AND THE PERSISTENCE OF GENDER SEGREGATION IN OCCUPATIONS

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This study investigates whether the increasingly common trend of working long hours ("overwork") perpetuates gender segregation in occupations. While overwork is an expected norm in many male-dominated occupations, women, especially mothers, are structurally less able to meet this expectation because their time is subject to family demands more than is men's time. This study investigates whether the conflicting time demands of work and family increase attrition rates of mothers in male-dominated occupations, thereby reinforcing occupational segregation. Using longitudinal data drawn from the Survey of Income and Program Participation, I show that mothers are more likely to leave male-dominated occupations when they work 50 hours or more per week, but the same effect is not found for men or childless women. Results also show that overworking mothers are more likely to exit the labor force entirely, and this pattern is specific to male-dominated occupations. These findings demonstrate that the norm of overwork in male-dominated workplaces and the gender beliefs operating in the family combine to reinforce gender segregation of the labor market.

Keywords: *work/family; work/occupations; family*

Despite the increasing numbers of women entering traditionally male-dominated occupations, the U.S. labor market continues to be segregated by gender (Charles and Grusky 2004; Tomaskovic-Devey et al. 2006).

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While the level of segregation is substantially reduced compared to that of the 1970s, the current level of segregation still requires 40 percent or more of men or women to change occupations to reach complete integration. Moreover, the desegregation rate has been slowed or even stalled after the mid-1990s (e.g., Hegewisch et al. 2010; Weeden 2004). One reason for the slow change is that occupational segregation is deeply embedded in workplace norms and employment practices that endorse the existing gender hierarchy (Acker 1990; Charles and Grusky 2004; Ridgeway 2011; Williams 2000). This study identifies the process through which occupational segregation is reinforced by an increasingly common trend in the workplace: long work hours ("overwork").

The proportion of employees who work long hours increased dramatically in the past half century. Jacobs and Gerson (2004) report that between 1979 and 2000, the proportion of those who work 50 hours or more per week increased from 21 to 27 percent for men and 5 to 11 percent for women. A variety of factors have been associated with this growing trend: increased domestic and international competition followed by employers laying off a massive number of employees while demanding higher productivity from the survivors (Bluestone and Rose 1997; Kalleberg 2007); changes in compensation systems that promote competition among workers (Landers, Rebitzer, and Taylor 1996; Sharone 2004); the rise of the "24/7" economy (Presser 2005); and increased earnings inequality (Kuhn and Lozano 2008). While these studies identify various macro-structural shifts as the forces driving increased work hours, they also commonly recognize the normative aspect of work hours as a proximate cause. Those who work long hours are considered more productive and committed (Epstein et al. 1999; Hochschild 1997) and are rewarded with upward mobility, financial security, and recognition from colleagues (Blair-Loy 2003; Landers, Rebitzer, and Taylor 1996; Sharone 2004). In contrast, employees who violate this norm are perceived as less committed to their careers and disadvantaged in terms of promotion and reputation.

This standard appears at first to be gender-neutral, given that the work-hour norm applies to men and women equally. However, the conditions that enable men and women to meet this standard differ widely. Women still bear greater familial obligations, even when employed full time, that hinder their career advancement in jobs requiring complete time devotion to work (Bianchi et al. 2000; Epstein et al. 1999; Kelly et al. 2010; Stone 2007; Williams 2000). In a workplace that values overwork, women are more likely to be evaluated poorly, less likely to receive opportunities for promotion (e.g., Epstein et al. 1999; Roth 2006), and more likely to leave

their jobs than men (e.g., Stone 2007). Building on this literature, this study demonstrates that overwork (here defined as weekly work hours of 50 or more) is an important source of occupational segregation, a well-known proximate cause of many forms of gender inequality (see Reskin 1993).

This study further investigates whether the overwork phenomenon and its implications for gender inequality are more pronounced in male-dominated occupations than in other occupations. Many prior studies note that work hours tend to be especially long in professional and managerial occupations (Jacobs and Gerson 2004; Kuhn and Lozano 2008), and the penalty for deviation from the norm tends to be strongest (e.g., Blair-Loy 2003; Epstein et al. 1999; Fried 1998; Roth 2006; Stone 2007; Xie and Shauman 2003). While these studies focus mostly on professional or high-level managerial occupations, other scholars have indicated that some male-dominated nonprofessional occupations, such as construction, protective services, and operative occupations, also require long work hours, mandate overtime hours, or often expect workers to be *only* full-time workers (e.g., Ely and Meyerson 2010; Gale 1994; Kalleberg 2007; Spurgeon, Harrington, and Cooper 1997; Vila 2006). In the present study, I argue that strong enforcement of the overwork norm is an important feature of male-dominated workplaces, in which jobs are built on the normative conception of the "separate spheres," consisting of breadwinning men and homemaking women. I then show that the underrepresentation of women in male-dominated occupations is exacerbated by the extent to which overwork increases the attrition of women from male-dominated occupations.

Analytically, there are two ways in which long work hours could reinforce occupational segregation. First, the anticipation of overwork may deter women's entrance into male-dominated occupations. Given the prevailing expectation that women will be their family's primary caregiver, they may expect difficulties in managing career and family, which would reduce the rate of their entry into male-dominated occupations. Second, the greater time demands of the workplace may intensify work–family conflicts, which increase women's attrition rates from these occupations. This study focuses on this exit process, which is underexplored in the segregation literature (for reviews, see Reskin 1993).

I also expect the overwork effect to be different for women with children and childless women. Like the workplace, the family is a well-known "greedy institution," which "seek[s] exclusive and undivided loyalty" from its members, disregarding the competing demands from other domains (Coser 1974, 4; also see Blair-Loy 2003; Epstein et al. 1999). The "greedy" aspect of family is well represented by the "intensive

mothering" ideology, prescribing a mother's complete and exclusive devotion of time, energy, and emotion to children's needs (Hays 1998).[1] This norm may further limit mothers' time availability for overwork. To investigate this conjecture, I examine whether having children exacerbates the negative effect of overwork.

I argue that the overwork norm is built on the social organization of work and family, both of which are "greedy" and "gendered" institutions, the organizing principles of which are provided by widely shared gender beliefs on caregiving and breadwinning. Drawn from the literature on "gendered organizations" (e.g., Acker 1990), this study demonstrates that the strong norm of overwork in male-dominated workplaces and the gender beliefs operating in the family combine to reinforce occupational segregation.

OVERWORK AND GENDER

The tight connection between workers' perceived productivity and work hours stems from the deeply engrained cultural notion of the "ideal worker" (Williams 2000). Ideal workers are defined as those who *can* and *are willing to* serve the needs of the workplace without being disrupted by nonwork demands. The overwork norm is built on this conception, prescribing that good workers should be ready to devote their time entirely to paid work. However, complete devotion is also demanded by the family, which creates conflicts for those bounded by both norms.

While appearing gender-neutral, the work–family conflict is neither created nor resolved in gender-neutral ways. The organizing logics and principles of these two institutions are provided by gender beliefs, which prescribe culturally defined appropriate behaviors for men and women (Acker 1990). Although dual-earner families make up the majority of today's workforce, and nearly 40 percent of all mothers are primary breadwinners (Boushey 2009), the gender beliefs of male breadwinning and female caregiving remain a strong cultural ideal that organizes individual time use. Even when women bring more income to the family, they spend 30 percent more time with children than do their husbands (Raley, Bianchi, and Wang 2012), do a larger share of day-to-day child care (Maume 2008), and make most major decisions about child-rearing (Crittenden 2002). Despite the increased time they spend in paid labor, contemporary women also spend the same or a greater amount of time with their children compared to women in the past (e.g., Bianchi, Robinson, and Milkie 2007).

Violating this norm incurs severe penalties. Although the negative perceptions about working mothers are decreasing, about one out of three Americans still believe that preschoolers suffer when their mothers are employed (Cotter, Hermsen, and Vanneman 2011). Highly successful mothers are viewed as colder and less likable than highly successful fathers (Benard and Correll 2010). Women themselves feel guilty and suffer from psychological distress more than men do when their work interferes with their family life (Glavin, Schieman, and Reid 2011).

Men also increasingly experience work–family conflicts as the proportion of dual-earner families increases (e.g., Glavin, Schieman, and Reid 2011; Jacobs and Gerson 2004), but the normative expectations of the two institutions are not nearly as orthogonal for men as they are for women (Blair-Loy 2003; Damaske 2011). Although contemporary men spend more time on housework and child care compared to past generations (Bianchi, Robinson, and Milkie 2007), male breadwinning still remains a core component of the normative ideals of fatherhood and masculinity (e.g., Miller 2011; Townsend 2002). Men who are not the primary breadwinner still experience penalties, such as being seen as unsuccessful and irresponsible, whereas women's quitting employment or reducing work hours are often expected and rewarded by social affirmation (Potuchek 1997; Townsend 2002).

Certainly, as the ideal of "good fathers" evolves, contemporary fathers express increasing interests in spending more time with their children (Milkie et al. 2004). However, their desire and intentions for shared parenting do not necessarily lead to actual time spent with children. Miller (2011) found that many new fathers in the U.K. support equal parenting and practiced it when their first child was born, but their behaviors are often reshaped as they discover that the ideal of "involved fatherhood" clashes with workplace expectations.

Combined with the normative conception of ideal motherhood, the male breadwinning ideology leads many dual-earner couples to resolve work–family conflicts by prioritizing the man's career even when the woman earns as much income as he does (Becker and Moen 1999; Pixley and Moen 2003). Also, when men work long hours, this limits their contribution to nonwork responsibilities and in turn restricts women's time for work, while women's overwork rarely affects their husbands' work (Cha 2010). Under the normative pressure of being the ideal mother with little spousal support, it is structurally difficult for women, especially mothers, to meet the ideal worker norm.

To highlight the fact that normative expectations in the workplace and family are contradictory for workers with family responsibilities, numerous

gender scholars argue that many workplace norms and practices are designed to suit male breadwinners' lifestyle (e.g., Acker 1990; see also Kelly et al. 2010; Williams 2000, 2010). When combined with the gender norm operating in the family, mothers, who do not conform to this assumption, are systematically disadvantaged by the norm, leading them to leave the labor force (Damaske 2011; Stone 2007), shift to the "mommy track" (Crittenden 2002; Epstein et al. 1999), or enter the less remunerative self-employment sector (Budig 2006). Building on this research, this study shows that overwork reinforces occupational segregation by creating barriers for mothers, preventing them from advancing their careers in male-dominated occupations.

OVERWORK AND GENDER SEGREGATION OF OCCUPATIONS

I expect that not only individual time availability but also the extent to which the workplace enforces the work-hour norm determines the negative effect of overwork on women's career outcomes. In male-dominated occupations, with more men who are structurally able to meet the ideal worker norm, the norm is enforced more strongly. Work hours tend to be longest, and the importance of work hours as a proxy for productivity or commitment greatest, in male-dominated occupations (e.g., Boulis and Jacobs 2008; Epstein et al. 1999; Roth 2006; Sharone 2004). Epstein et al. (1999, 25) report that part-time lawyers are rarely promoted to partner positions because they are perceived as "occupational deviants" (see also Landers, Rebitzer, and Taylor 1996). This greater penalty for deviating from the norm hinders women's advancement in these professions. Women in corporate finance of top investment banks often move, or are encouraged to move, to administrative positions, where work hours tend to be shorter (Roth 2006). A substantial attrition of women is observed after a childbirth in the STEM fields (science, technology, engineering, and mathematics), in which work weeks are notably long (e.g., National Academy of Sciences 2006; Xie and Shauman 2003).

Although the overwork phenomenon is often discussed in the context of professional or managerial occupations, I argue that the work-hour effect is strongly associated with the proportion of men in the workplace. Not all professionals and managers experience the same level of pressure to overwork. Work hours tend to be shorter in many female-dominated professional occupations, such as school teachers, librarians, and therapists, as well as lower-level managers, and the penalty for deviating from

the norm tends to be smaller. In contrast, the work-hour norm is strict in male-dominated nonprofessional occupations, such as production and operative and protective-service occupations (Gale 1994; Kalleberg 2007; Spurgeon, Harrington, and Cooper 1997; Vila 2006). Because the Fair Labor Standards Act mandates overtime pay for hourly workers working more than 40 hours a week, the proportion of employees who work extreme work weeks is lower in nonprofessional occupations compared to professional and managerial occupations, in which the proportion of salaried workers is higher (Kuhn and Lozano 2008). Even so, jobs in skilled blue-collar occupations are mostly full-time positions, and with the absence of laws that prohibit compulsory overtime work, overtime hours are frequently expected or mandated in these occupations (Golden 2000; Kalleberg 2007). Operative occupations also require frequent and irregular travel (e.g., truck drivers, drill crews, marine engineers), requiring long hours with very little flexibility (Ely and Meyerson 2010; McCartt et al. 2000; Spurgeon, Harrington, and Cooper 1997), a critical factor that exacerbates perceived work–family conflicts (Kelly, Moen, and Tranby 2011). Many construction jobs are seasonal, and work hours tend to be irregular and long (e.g., Gale 1994). While the proportion of families with the traditional breadwinner-homemaker arrangement has decreased, jobs are still organized in ways that assume a traditional arrangement (Williams 2010). Furthermore, the growth of weekly overtime hours reached its peak at 4.9 hours by the late 1990s, most notably in manufacturing jobs (Hetrick 2000). With the rise of the so-called 24/7 economy, the demand for long work hours in operative occupations has also increased (Presser 2005).

Several other structural features specific to male-dominated occupations may also magnify the overwork effect. First, a dearth of alternative arrangements (e.g., reduced work hours, flexible hours or locations) may exacerbate time conflict. Although male-dominated jobs in professional and managerial occupations actually offer greater flexibility than do many female-dominated jobs (e.g., Glass and Camarigg 1992), a large financial and reputational penalty inhibits use of flexible arrangements (Boulis and Jacobs 2008; Fried 1998). Employers or bosses often refuse workers' requests to work part time, and even when they switch to a "part-time" arrangement, they sometimes wind up working full-time hours (Stone 2007). Furthermore, as a numerical minority, women in male-dominated occupations suffer from a lower level of social support and heightened visibility, which may exacerbate their attrition due to aggravated time conflicts (e.g., Kanter 1977; also see Taylor 2010). For these reasons, I expect that overwork exacerbates women's attrition more in male-dominated occupations than in other occupations.

DATA, MEASURES, AND METHODS

The primary data used in this study are drawn from the Survey of Income and Program Participation (SIPP), a national longitudinal household survey (U.S. Census Bureau /National Bureau of Economic Research). The panel structure allows me to observe changes in the labor market outcomes of men and women, including their occupations. The sample size of SIPP is larger than any other labor market panel data, an important condition for modeling rare events like mobility. The SIPP respondents were interviewed every four months, over three (2001 panel) to four years (1996 and 2004 panels). The most recent three panels are pooled in order to boost the cell counts in the mobility variable (see Table S5 in the Supplementary Appendix, which can be found at http://gas.sagepub.com/supplemental/).

The sample is limited to noncontingent workers aged 18 to 64 who have positive earnings in the first time point.[2] Also, because the focus of this study is on the movement out of male-dominated occupations, the first analytic sample includes those who initially worked in male-dominated occupations only. The last analysis, however, uses pooled data that also include those who had a job in other occupations, in order to evaluate whether the effect found in the male-dominated occupations is unique to these occupations. The distinction between male-dominated and other occupations is based on a conventional cut-off point of 30 percent of women in the occupations (e.g., Jacobs 1989; Kmec 2005), but the results are robust to other cut-off points (e.g., 27 and 33 percent). The gender composition of the occupation is measured at the most detailed occupation level. Because there was a drastic occupational-classification change in the middle of the study period (the first two panels use the 1990 Census Occupation Classification [COC], but SIPP 2004 adopts the 2000 COC), I employ a consistent set of occupation codes developed by the Bureau of Labor Statistics (BLS) (Meyer and Osborne 2005). The BLS-proposed codes are based largely on the 3-digit 1990 COC, but is less detailed, offering 382 occupations after excluding military occupations. Male-dominated occupations in the sample include 173 occupations (e.g., legislators, physicians, lawyers, engineers, natural scientists, architects, technologists, technicians, protective service workers, farm managers, computer software developers, construction workers, production supervisors, and operatives). The gender composition of occupations is calculated from a larger data set, the Integrated Public Use of Microdata Series (IPUMS) 5 percent samples (Ruggles et al. 2010), to obtain more reliable

estimates. The final sample consists of 201,135 observations. The sample size for men (176,086) is larger than that for women (25,049) because of the lower representation of women in male-dominated occupations.

The dependent variable is a dichotomous measure that indicates whether a respondent moves out of the male-dominated occupation after four months. If the respondent leaves a male-dominated occupation for a non-male-dominated occupation or leaves the labor force entirely, the dependent variable is coded 1; if the respondent stays in the same job or moves to another male-dominated occupation, it is coded 0.[3] Those who are temporarily absent from work (e.g., those who are on sick or family leave, or on vacation) are considered "stayers." To accurately capture mobility driven by overwork rather than by external macroeconomic conditions or worker heterogeneity, I exclude those who leave their jobs as a result of job displacement, layoff, or health reasons, as well as those who reported that they were "not interested in work."[4]

To capture the exit rates that are driven by long work hours, I allow a four-month time lag between individual mobility and the independent variables. As shown in Table 1, roughly 4 percent of men who formerly worked in male-dominated occupations exit these occupations after four months. Not surprisingly, the exit rate is higher for women (8 percent) than for men.

The key independent variables are measured by a series of dummy variables indicating weekly usual work hours in respondent's main job: (1) less than 35 hours ("part-time"), (2) 35 hours or more but less than 50 hours ("full-time," reference category), and (3) 50 hours or more ("overwork"). While some prior research defines overwork as 40 hours or more, to which an overtime pay rate is applied in some production and service jobs, I employ a 50-hour cut-off point to reflect increased work hours in recent years, following the most recent studies (e.g., Jacobs and Gerson 2004; Schieman, Glavin, and Milkie 2009); however, the findings reported here are not sensitive to any particular cut-off points.[5] I use categorical variables instead of continuous variables in recognition of likely nonlinearities in the effect of work hours: While I expect that long work hours increase women's likelihood of exiting male-dominated occupations, part-timers may exit male-dominated occupations at higher rates, too, given penalties attached to part-time work (e.g., Epstein et al. 1999). The descriptive statistics in Table 1 reveal a substantial time divide between men and women: 20 percent of men but 13 percent of women work 50 hours or more, while the percentage of women working part-time is more than double that of men (14 percent vs. 6 percent).

TABLE 1: Means and Standard Deviations of Variables Used for the Analysis of Workers in Male-Dominated Occupations, SIPP 1996, 2001, and 2004 Panels (1996-2007)

	Men		*Women*	
Variable	*Mean*	*SD*	*Mean*	*SD*
Moving out of male-dominated occupations	0.04		0.08	
Usual work hours per week (≥35 hours <50 hours is omitted):				
<35	0.06		0.14	
≥50	0.20		0.13	
Have child	0.46		0.44	
Age	40.11	10.99	39.87	10.34
Age squared	1729.31	899.40	1696.92	847.55
Currently married	0.68		0.55	
Race ("white" is omitted)				
Black	0.09		0.14	
Hispanic	0.12		0.08	
Other	0.04		0.06	
Education ("less than high school" is omitted)				
High school graduate	0.35		0.29	
Some college	0.34		0.30	
College graduate	0.11		0.17	
Advanced degree	0.06		0.15	
Work experience	20.81	11.37	17.85	10.46
Work experience squared	562.41	505.89	428.05	422.27
Tenure	8.32	8.79	7.15	7.65
Tenure squared	146.59	264.18	109.66	208.75
Monthly earnings (in $100)	31.90	30.45	29.23	30.89
Union	0.21		0.15	
Government	0.14		0.19	
Year (10 categories)		(not shown)		
Number of observations	176,086		25,049	

In my theoretical argument, one key factor differentiating the likelihood of exiting male-dominated occupations for men and women is time availability determined by gendered expectations about caregiving. To test this argument, I fit the interaction effect between the work hour variables and an indicator of whether the respondent has a child under the age of 18 residing in the same household.[6]

I also include standard covariates in the models predicting mobility: age; age squared; marital status (currently married or unmarried); education (5 categories); years of work experience, job tenure, and their squared terms; monthly earnings (in 2000 dollars re-scaled as 100s of dollars to

carry fewer decimal points); union membership; public sector; service sector; and a set of dummy variables for year (to adjust for any macroeconomic conditions).

To investigate whether individual workers move out of male-dominated occupations in response to their long work hours, I employ logistic regression models. A random intercept term is included to account for the dependence among observations introduced by the panel structure of the data.[7] The models take the following general form:

$$\log \frac{p_{ij}}{1 \quad p_{ij}} = x_{ij}\beta + \alpha_i + \varepsilon_{ij} \tag{1}$$

where p_{ij} is the probability of exiting male-dominated occupations by the next time point (four months later), x_{ij} is a row vector of variables for individual i at time j, and β is a column vector of regression coefficients. Residuals are composed of two parts: α_i represents random intercepts for persons, assumed to be uncorrelated with x_{ij} and normally distributed with a mean of zero and constant variance; ε_{ij} is a random disturbance term.[8] I fit all models separately for women and men to allow all covariates to vary by gender.

While this study focuses on the exit process, ignoring the process of entering male-dominated occupations could introduce selection bias: Entering or staying in male-dominated occupations is likely to be a non-random process, and the characteristics of those who enter male-dominated occupations instead of female-dominated occupations, and remain there rather than moving to other occupations, may affect the attrition rates from male-dominated occupations. I expect that this selectivity is likely to *underestimate* the observed overwork effect more for women than men, given anticipated barriers such as overwork, discrimination, sexual harassment, and the lack of social support that disproportionately suppresses the likelihood of women entering or staying in male-dominated occupations (Long 2001; McLaughlin, Uggen, and Blackstone 2012; Taylor 2010). Put differently, women who "survived" in male-dominated occupations and were observed in the sample are likely to be more committed and to have better labor market qualifications than other women, which suppresses their exit rates from male-dominated occupations.

I assess this possibility by analyzing the data of workers who are in male-dominated occupations, but weighting the models with the inverse of the probability of being observed in male-dominated occupations.[9] This way, the weighted models reflect the characteristics of all workers in the full labor market, instead of workers found in male-dominated occupations only. Comparing the results from the weighted models to those of unweighted models helps to assess how the non-random selection process

associated with entering the sample influences the estimated effect of overwork. The probability of being in male-dominated occupations is calculated from a logistic regression model in which log odds of being in male-dominated occupations are predicted by all covariates included in the final models and additional interaction terms among them. The balance of these variables was assessed using standardized differences (see Morgan and Todd 2008). Details of the construction of this weight are provided in the Supplementary Appendix (which can be found at http://gas.sagepub.com/supplemental/).

RESULTS

I begin by examining a bivariate association between gender composition and work hours at the occupation level to illustrate that long work hours may be an important factor associated with occupational segregation. Figure 1 presents work hours at the occupational level by percentage of women in the occupation. The first panel illustrates average work hours within each occupation, and the second panel shows the percentage of those who work 50 or more hours per week, both by deciles divided by percentage of women in the occupation.

Both panels indicate a clear negative association between women's representation and long work hours. In occupations with less than 10 percent women, the average work hours are 43.1 (Figure 1a), and the percentage of overworkers is 22.2 (Figure 1b). In occupations with 20 to 30 percent women, the average weekly work hours and the percentage of overworkers decreases to 41.7 and 20.7, respectively. In female-dominated occupations consisting of 70 percent or more women, the average work hours are all about 35 or under, roughly 20 percent shorter than those of occupations with 10 percent women. The percentage of overworkers in the three most female-dominated occupation categories are 6 to 8 percent, roughly a third of those shown in the three most male-dominated occupation categories. These results support the contention that a strong, negative association is present between overwork and women's low representation in male-dominated occupations. It remains to be seen, however, how individual mobility processes reinforce this pattern, which I now address.

Does Overwork Increase the Attrition of Women from Male-Dominated Occupations?

To evaluate whether overwork increases women's likelihood of leaving male-dominated occupations, but not men's, I report models predicting

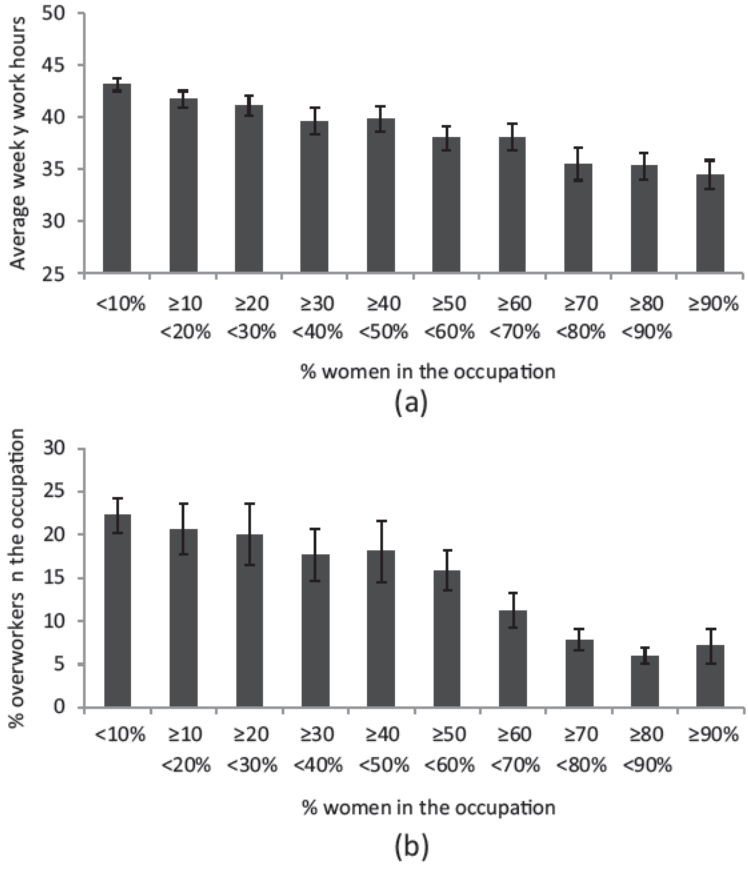

Figure 1: (a) Average work hours and (b) percentage of overworkers in the occupation and 95% confidence interval
SOURCE: Author's calculation from IPUMS 1990 & 2000.

the log odds of one's exiting a male-dominated occupation from the work hour variables (see Table 2). Although the coefficients are presented in the metric of log odds, I exponentiate them to discuss the magnitude in terms of the factor change or percentage change in odds. One of the key conditions that led me to expect to find a gender difference is a differentiated amount of nonwork responsibilities that limit availability for overwork. To investigate this possibility, I allow interaction effects between parental status and the work-hour variables. If caregiving responsibilities are the

TABLE 2: Random Effects Logistic Regression on the Log Odds of Leaving Male-Dominated Occupation

	Model 1		*Model 2*
	Men		*Women*
Usual work hours per week (≥35 hours <50 hours is omitted):			
<35 hours	0.360**		0.425**
	(0.055)		(0.112)
≥50 hours	–0.006		–0.062
	(0.048)		(0.127)
Have children	–0.009		0.086
	(0.038)		(0.081)
× <35 hours	0.120		–0.123
	(0.089)		(0.152)
× ≥50 hours	–0.035		0.416*
	(0.071)		(0.190)
Other covariates [a]		included	
$\hat{\rho}$ [b]	0.248		0.326
Number of persons	32,810		5,868
Number of observations	176,086		25,049

NOTE: Standard errors are presented in parentheses.
a. See the list of covariates in Table 1; the full models are available in Table S4 of the Supplementary Appendix, which can be found at http://gas.sagepub.com/supplemental/.
b. $\hat{\rho}$ is the proportion of the total variance contributed by the person-level variance component.
*$p < .05$, **$p < .01$ (two-tailed).

key condition that differentiates why men and women respond differently to long work hours, we would find a positive coefficient for the interaction effect only for women.

As expected, the interaction effects demonstrate that being a mother significantly increases the odds of overworking women leaving male-dominated occupations. In Model 2, the coefficient of the interaction effect between working 50 hours or more and having children is .42, meaning that having children increases overworking women's odds of exiting male-dominated occupations by 52 percent,[10] as compared to their nonmother counterparts. Also notice that the main effect of overwork for women is negative and nonsignificant, meaning that the nonmothers' odds of leaving male-dominated occupations are not affected by long work hours. This effect is consistent with the argument that caregiving responsibilities are the key factor that differentiates the effect of overwork on men's and women's mobility outcomes.

By contrast, for men, the same interaction effect shows negative value (–.035), and the standard errors for these interaction terms are too large from which to draw any conclusions. This nonsignificant effect suggests that being a father has no effect on the mobility of overworking men.[11] This gender difference, together with the nonsignificant result for childless women, supports the argument that a greater amount of caregiving responsibilities aggravates time conflicts and increases the exit rates of women in male-dominated occupations.

The magnitudes of these effects are better illustrated by the changes in predicted probabilities. Figure 2 depicts the relationship between overwork and the probability of leaving male-dominated occupations for workers without children (Figure 2a) and workers with children (Figure 2b). The Y-axis represents the predicted probability of exiting male-dominated occupations of a man and woman who show average values for all covariates. The values are presented as percentages (multiplied by 100) to carry fewer decimal points. The calculation of the predicted probabilities is based on models in Table 2 and equivalent models using data weighted by the estimated inverse probability of being in male-dominated occupations.

As discussed earlier, the predicted probabilities without weight adjustment (the left panels in Figure 2) show that overwork increases the attrition of mothers from male-dominated occupations, but not of men and childless women. Figure 2a shows that even when nonmothers work 50 hours or more, their rate of leaving male-dominated occupations (4.3 percent) is virtually identical to the rate for women who work full-time hours (4.5 percent), suggesting nonmothers' mobility is not affected by overwork. However, when mothers work 50 hours or more, their exit rates increase sharply (see Figure 2b). The unweighted model shows that the exit rate for mothers working full time is 4.9 percent, but it is 6.8 percent for mothers working 50 hours or more. The increment of 1.9 absolute percentage points (i.e., 6.8-4.9) is comparable to the effect of education for women. When the predicted probability is calculated in the same way (not shown), holding an advanced degree decreases the exit rate by 1.7 absolute percentage points, compared to holding less than a high school diploma (see also Table S4 in the Supplementary Appendix, which can be found at http://gas.sagepub.com/supplemental/, for the comparison of the coefficients). This exit-suppressing effect of education is completely offset by the overwork–motherhood interaction effect that increases the exit rate by 1.9 absolute percentage points.

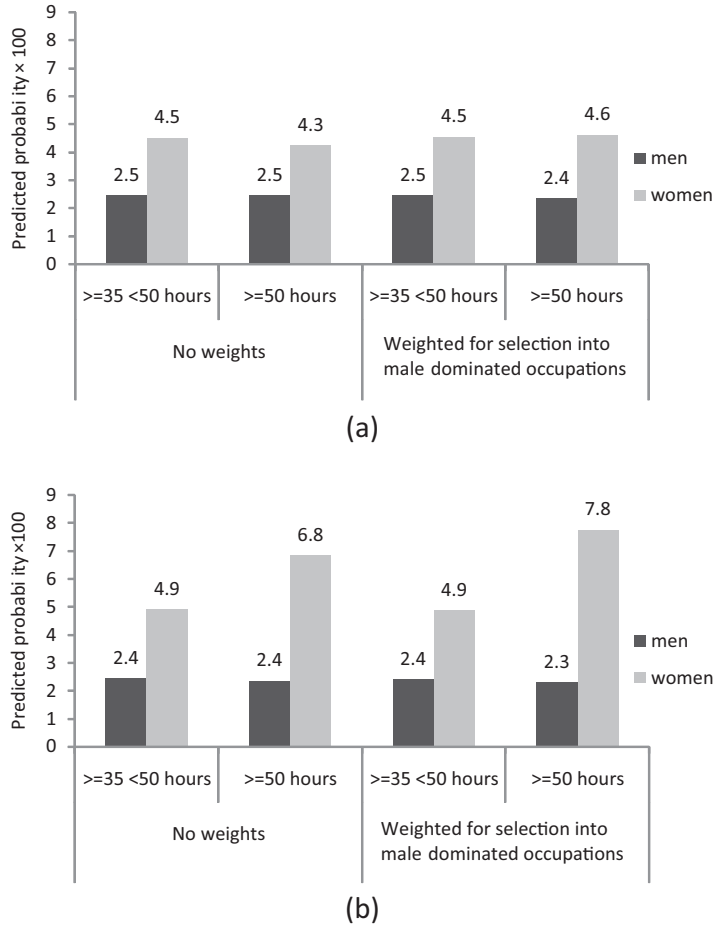

Figure 2: The predicted probability (×100) of leaving male-dominated occupations for (a) workers without children and (b) workers with children
NOTE: Estimates are derived from the models in Table 2. All other variables are set to their mean values of unweighted sample.

When we compare the exit rate of full-time working mothers (4.9 percent) to that of their childless counterparts (4.5 percent), the differences are negligible. This suggests that motherhood status alone does not increase the exit rates; what drives women's exodus from male-dominated occupations are the joint effects of overwork and motherhood, which may reflect

the "greedy" as well as "gendered" nature of family that demands disproportionately more hours from mothers.

Figure 2 also shows the predicted probabilities calculated from the models that adjust for the estimated inverse probability of being in male-dominated occupations. The coefficients of the weighted models reflect the log odds that would prevail if *all* workers were found in male-dominated occupations. This allows me to evaluate whether the particular characteristics of workers who are selected into male-dominated occupations may explain away the overwork effect found in unweighted data. If the overwork effect were present only because a group of women in male-dominated occupations were less qualified for the job, or less committed to their careers (negative selection), we should see the overwork effect diminishing in the weighted models. However, if the group of women found in male-dominated occupations were more qualified and committed than their counterparts in other occupations (positive selection), we should see the overwork effect magnified in the weighted models.

The predicted probabilities based on weighted models support the positive selectivity conjecture. The exit rate for mothers working full-time hours is 4.9 percent, and the rate jumps to 7.8 percent for mothers working 50 or more hours per week. Compared with the changes observed in the unweighted models (from 4.9 to 6.8 percent), the changes are slightly greater. The predicted probability for mothers working 50 hours or more is 15 percent greater than the one from the unweighted model (i.e., 7.8/6.8; see Figure 2b). This suggests that under the counterfactual scenario that women in male-dominated occupations showed labor market qualifications that were similar to those of women in the entire labor market, their odds of exiting male-dominated occupations would have been greater, by 15 percent. Put differently, better labor market qualifications for mothers who are found in male-dominated occupations suppress 15 percent of the overwork effect that otherwise would have prevailed. This is not the case for men. The predicted probabilities remain virtually the same after the weight adjustment.[12]

Finally, although not directly related to predictions made earlier, the effect of the part-time hour variable is worth examining. The models in Table 2 show that part-time workers are more likely to exit male-dominated occupations for both men and women. This is consistent with prior research that reports employment for part-time workers is less stable than for full-time workers (Tilly 1996). The interaction effects show that parental status does not significantly differentiate the part-time effect for either men or women.

In summary, the results support the contention that overwork is an important factor that reinforces occupational segregation by increasing the exit rates of mothers from male-dominated occupations (by roughly 2 absolute percentage points for women with average sample characteristics). One could still argue, though, that the overwork effect found for women may be driven by characteristics of the group of women who work long hours. While there is no direct way to evaluate this alternative explanation, given the lack of data on workers' gender ideology or levels of work commitment, I speculate that any selection effect would underestimate the overwork effect, as we saw in the selection process into male-dominated occupations (also see Table S7 in the Supplementary Appendix, which can be found at http://gas.sagepub.com/supplemental/, for the comparison of characteristics between overworkers and nonoverworkers).

Is the Overwork Effect Greater in Male-Dominated Occupations?

In this final analysis, I fit the interaction effects among overwork, parenthood, and being in male-dominated occupations to the full labor market data. Whereas earlier analyses examine the rate of exiting the labor force and occupational changes together, this final analysis focuses on only those who leave the labor force. Methodologically, if occupational changes are included, the dependent variable would measure a different phenomenon for those who work in male-dominated occupations and for those who are in other occupations.[13] Substantively, this analysis captures the effect of overwork on labor force exit, allowing me to evaluate the question of "opting out" (see Belkin 2003; Stone 2007).[14] Models in Table 3 are equivalent to the models in Table 2, but with additional interaction effects among overwork, parenthood, and male-dominated occupations to assess whether overworking mothers leave the labor force at higher rates than mothers in other occupations.

As expected, the three-way interaction effects among overwork, parental status, and being in a male-dominated occupation are positive, indicating that the overwork effect is greater for mothers in male-dominated occupations than for mothers in other occupations. Specifically, the odds of overworking mothers leaving the labor force are roughly three times greater if they are in male-dominated occupations. The same variable is in the opposite direction for men (the coefficient = –.54), suggesting that the odds of overworking fathers leaving the labor force *decline* by 42 percent when they work in male-dominated occupations, instead of other occupations. This finding indicates that the gender-differentiated overwork effect is particularly stronger in male-dominated occupations. For women, the

TABLE 3: Random Effects Logistic Regression on the Log Odds of Leaving the Labor Force for the Full Labor Market

	Model 1	*Model 2*
	Men	*Women*
Usual work hours per week (≥35 and <50 hours is omitted):		
<35 hours	0.404**	0.268**
	(0.077)	(0.049)
≥50 hours	–0.301**	–0.080
	(0.108)	(0.095)
Have child	0.089	0.271**
	(0.078)	(0.044)
× <35 hours	0.078	0.066
	(0.132)	(0.063)
× ≥50 hours	0.057	0.133
	(0.177)	(0.145)
Male-dominated occupation	0.069	0.186
	(0.062)	(0.103)
× <35 hours	0.090	–0.145
	(0.121)	(0.202)
× ≥50 hours	0.278	–0.558
	(0.148)	(0.342)
× child	–0.031	0.102
	(0.104)	(0.141)
× <35 hours × child	–0.071	0.184
	(0.213)	(0.265)
× ≥50 hours × child	–0.536*	1.065*
	(0.257)	(0.433)
Covariates[a]	included	
$\hat{\rho}$[b]	0.350	0.277
Number of observations	377,376	374,060
Number of persons	59,487	60,440

NOTE: Standard errors are presented in parentheses.

a. The full models are available in Table S9 of the Supplementary Appendix, which can be found at http://gas.sagepub.com/supplemental/.

b. $\hat{\rho}$ is the proportion of the total variance contributed by the person-level variance component.

*$p < .05$, **$p < .01$ (two-tailed).

effect is specific only to male-dominated occupations, as indicated by the nonsignificant two-way interaction effect between overwork and having children.

The findings in this last analysis also help to specify the mechanism driving the overwork effect. While I have argued that caregiving responsibilities disproportionately performed by mothers and the stronger expectation of overwork in male-dominated occupation are the driving factors of the

overwork effect, an alternative interpretation may be that the observed overwork effect merely captures women's preference or ideological changes at different stages in the life course (e.g., women of child-rearing age simply prefer to leave the job to stay home with children). However, if mothers leave male-dominated occupations because of their preference or ideological changes, we would have observed the same overwork effect for women across all occupations. The results in Table 3 do not support this conjecture: The overwork effect is present only for mothers in male-dominated occupations, suggesting that the normative pressure from the workplace plays an important role.

One remaining possibility is that higher spousal income for women in male-dominated occupations may explain the higher labor force exit rates. That is, labor force exit may not be a viable option for those whose income is crucial to financially maintain their families (e.g., Bardasi and Wodon 2010), and this income effect may explain the higher labor force exit rates of overworking women in male-dominated occupations. A supplementary analysis of a subsample of dual-earner couples shows that adjusting for spousal income does not explain away the overwork effect for mothers in male-dominated occupations leaving the labor force.

CONCLUSION

This study identifies a process through which long work hours reinforce gender segregation in occupations. Because overwork conflicts with societal expectations about child-rearing, mothers are less likely to maintain careers in male-dominated fields in which an overwork norm is more strongly enforced. The results show that overworking mothers leave male-dominated occupations at higher rates than men or nonmothers.

These findings shed light on why women's representation is especially low among the most prestigious jobs. Prior studies show that the "leaking pipeline" of women is due to a number of structural factors that hinder their career progress, such as workplace discrimination, lack of institutional support, and family responsibilities (Long 2001; National Academy of Sciences 2006; Xie and Shauman 2003). This study demonstrates that overwork, perhaps interacting with these factors, is an important feature of male-dominated occupations that increases women's attrition, especially during the child-rearing years.

An established body of research has shown that mothers in the United States fare worse in the labor market than men and childless women (e.g., Budig and England 2001; Waldfogel 1997). Building on this research, the present study sheds light on the sources of the continuing disparity

between mothers and other workers by pointing to overwork that may preclude mothers from many high-paying male-dominated occupations and increase the attrition once therein.

This study also has an important implication for work–family conflict at the policy level. Although work–family conflict is a structural problem, resulting from the institutional and organizational arrangements built upon the separate spheres assumption, work–family conflict is typically expected to be resolved at the individual level (Stone 2007; Williams 2010). Because the family, like the workplace, is a "greedy" and "gendered" institution, if individuals are held accountable for solving work–family conflicts, their solutions are likely to be influenced by existing gender beliefs and to negatively affect women's career outcomes. The ultimate solution would be the degendering of society, eliminating the deeply rooted gender beliefs embedded in social institutions in various forms. On a more practical level, however, national-level policies, such as setting the maximum allowable work hours, prohibiting compulsory overtime, expanding the coverage of the FLSA's overtime provisions, and granting employees the right to work part-time hours without losing benefits, could help to alleviate the overwork culture at work. These policies are in fact widely implemented in many European countries and help to ameliorate work–family conflicts (Golden 2000; Gornick and Meyers 2003). In addition, institutional pressures through fair labor or employment discrimination lawsuits or movements by activists may strengthen the enforcement of the existing policies.

Over the past decade, we have seen signs of slowing progress toward gender equality: slow convergence in the gender wage gap, the leveling off of women's labor market participation rates, and a slowdown in the rate of occupational desegregation (Blau and Kahn 2006; Bureau of Labor Statistics 2006; Charles and Grusky 2004). The causes of this slowed progress may be found in new sources of gender inequality created or reestablished by gender beliefs in contemporary institutions and organizations (Ridgeway 2011). Linking one important workplace norm—overwork—and occupational segregation, this study enhances our understanding of social processes through which gender inequality is reproduced by the social organization of work and family.

NOTES

1. Following Coser and Coser (1976, 89), the concept of the family as a "greedy institution" is used to highlight the aspect of the family that inevitably creates conflicts with other institutions (e.g., Blair-Loy 2003; Jacobs and Gerson 2004).

2. Excluding workers under 25 or over 55 years old, who have a high propensity to leave employment for school or retirement, yields results similar to those presented here.

3. Roughly a third of movers quit the labor force, and the rest of them move to non-male-dominated occupations. The analysis separating them indicates a stronger effect for the labor force exit outcome.

4. Those who reported being uninterested in paid work or having illnesses are more likely to leave their job when they work long hours. Similarly, a company facing financial difficulties may pressure their employees to overwork before going out of business. Including these respondents in the reference category would increase the baseline quit rates, thereby underestimating the overwork effect.

5. Using various cut-off points (e.g., 40 or 48 hours; using 40- and 50-hour cut-off points with 35–40 hours set as the reference category) yields the same substantive conclusion.

6. The models further disaggregating the variable by youngest child's age (0 to 5 and 6 to 17) show that the overall effects are greater for mothers with older children, but the effect on leaving the labor force is only slightly greater for mothers of younger children. Although this finding should be interpreted with caution because the cell counts become sparse in disaggregating the variable, it is consistent with prior research reporting that parenting older children also entails intensive parental involvement for their psychological and cognitive development (e.g., Lareau 2003). In addition, using a linear measure of number of children does not alter the conclusion of this study.

7. One alternative modeling option is to use conditional logit models, which purge all between-person variance. While this strategy has the merit of adjusting for all stable worker characteristics, many models did not converge because of the rarity of mobility events. Models that do converge show results that are very similar to the ones presented here. Another option is a discrete time method, but SIPP has a relatively short panel and does not provide sufficient information on prior occupation changes or duration in the current occupation.

8. One could estimate the effect of the prevalence of overwork in the occupation, instead of individual overwork, using multilevel models in which individuals are nested in occupations. But individual hours are shown to more directly capture an individual's time availability and better predict work–family conflicts (e.g., Schieman, Glavin, and Milkie 2009). This alternative modeling strategy would also make it difficult to deal with the panel structure (monthly data are nested within the individual, and individuals are nested within the occupation, but occupations are time-varying).

9. The construction of the weight follows counterfactual modeling (see Morgan and Winship 2007) and weighted complete case analysis for a missing data adjustment (see Little and Rubin 2002).

10. $e^{0.42} = 1.52$.

11. The significant gender difference is also confirmed by the three-way interaction term (i.e., overwork × have children × women) in the pooled data.

12. This selectivity is likely to operate more strongly for older women than younger women. This could introduce heterogeneity to the "nonmothers" category that includes women whose children are over 18 and have already moved out of the household. However, excluding all women 45 years or older or excluding women 45 years or older among nonmothers only all yields the same, if not stronger, findings (see Table S6 in the Supplementary Appendix, which can be found at http://gas.sagepub.com/supplemental/). If the age-differentiated selectivity drove the motherhood effect on overwork, the motherhood–overwork interaction effect should diminish in these samples.

13. An alternative approach, such as fitting models separately for workers in male-dominated occupations and other occupations, leads to the same conclusion.

14. This last analysis also helps to ensure that the findings shown in prior analyses are not driven by the "other occupations" category being larger than the "male-dominated occupations" one, because exiting the labor force is not dependent upon the size of the next job's occupation category. Also, in the SIPP data, more than 70 percent of men who quit jobs in male-dominated occupations find their next job within the male-dominated occupation category, suggesting that occupational mobility is unlikely to be determined by random numerical chance.

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Change and stability in work family conflict and mothers' and fathers' mental health: Longitudinal evidence from an Australian cohort

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ABSTRACT

Work family conflict (WFC) occurs when work or family demands are 'mutually incompatible', with detrimental effects on mental health. This study contributes to the sparse longitudinal research, addressing the following questions: Is WFC a stable or transient feature of family life for mothers and fathers? What happens to mental health if WFC increases, reduces or persists? What work and family characteristics predict WFC transitions and to what extent are they gendered? Secondary analyses of 5 waves of data (child ages 4 5 to 12 13 years) from employed mothers (n = 2693) and fathers (n = 3460) participating in the Longitudinal Study of Australian Children were conducted. WFC transitions, across four two year intervals (Waves 1 2, 2 3, 3 4, and 4 5) were classified as *never*, *conscript*, *exit* or *chronic*. Significant proportions of parents experienced change in WFC, between 12 and 16% of mothers and fathers for each transition 'type'. Parents who remained in *chronic* WFC reported the poorest mental health (adjusted multiple regression analyses), followed by those who *conscripted* into WFC. When WFC was relieved (*exit*), both mothers' and fathers' mental health improved significantly. Predictors of *conscript* and *chronic* WFC were somewhat distinct for mothers and fathers (adjusted logit regressions). Poor job quality, a skilled occupation and having more children differentiated *chronic* fathers' from those who *exited* WFC. For mothers, work factors only (skilled occupation; work hours; job insecurity) pre dicted *chronic* WFC. Findings reflect the persistent, gendered nature of work and care shaped by workplaces, but also offer tailored opportunities to redress WFC for mothers and fathers. We contribute novel evidence that mental health is directly influenced by the WFC interface, both positively and negatively, highlighting WFC as a key social determinant of health.

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1. Introduction

Work–family conflict (WFC) occurs when the demands from work or family are 'mutually incompatible' (Greenhaus and Beutell, 1985), and affects significant proportions of the population in US, Europe, Canada and Australia (Erikson et al., 2010; Skinner et al., 2012; Duxbury and Higgins, 2001; Oun, 2012; Allen and Finkelstein, 2014). WFC generates strains and compromises in family life, impacting on when and how families interact, the time that parents and children have together and the emotional tone of family interactions (Parke, 2004; Crouter and Bumpus, 2001). Long and inflexible schedules, demanding, intensive work, unpredictable work times or a lack of autonomy generate time, emotional and cognitive deficits for parents that impede parents' capacity for caregiving (Cooklin et al., 2014a; Strazdins et al., 2004). There are also adverse workplace consequences, with WFC impacting on work performance, productivity, burnout and job turnover (Amstad et al., 2011; Butts et al., 2013; Kossek et al., 2011; Ferguson et al., 2012). One reason why WFC is so influential is its effects on mental health (Nohe et al., 2014; Eby et al., 2005; Carlson et al., 2011; Goodman et al., 2009). While it is clear that WFC and mental health are related at one point in time, studies are only now emerging to look at this relationship across many time points (Allen and Finkelstein, 2014; Goodman et al., 2009; Westrupp et al., 2015; Rantanen et al., 2012). We address these issues using 5 waves of parent data from a large cohort study of Australian children, tracking stability and change in their experience of combining work

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with family care over four two year intervals spanning ten years (from child age 4–5 to 12–13 years). Our study focusses on the mental health consequences of stability and change in WFC for Australian mothers and fathers. Specifically, we examine the following questions: Is WFC a stable or transient feature of family life and for whom? What happens to mental health of mothers and fathers if WFC increases, reduces or persists? If WFC does change, to what extent are the drivers gendered?

In most couple families paid work and care giving continues to be divided along gendered lines. In Australia, as in many other industrialized countries, fathers are typically employed full time, and often for an extended long working week (Charlesworth et al., 2011; Johnson et al., 2013; Bünning and Pollmann Schult, 2015). For families with young children, fathers usually shoulder the income burden as 'breadwinners', even while contemporary norms for fatherhood encourage active care giving (Marsiglio et al., 2004; Humberd et al., 2015). However, men's paternity (and care giving desires and responsibility) remains "a ghost in the organi zational machine": most workplaces continue to demand intensive, unrivalled time commitments to secure jobs or advancement (Burnett et al., 2012; Williams et al., 2013; Gatrell et al., 2015). Fa thers' can face even more stigma than mothers if they seek to access flexible, family–friendly work arrangements, and if they do access them, will suffer considerable career and income costs (Williams et al., 2013; Coltrane et al., 2013). Such a 'fixing' of fathers' avail ability and time to the workplace pushes many mothers to cut back their work hours, seeking part time or reduced hours in lower status jobs or industries (Kaufman and Uhlenberg, 2000; Sayer, 2005; Craig and Sawrikar, 2009). Thus, in Australia, the majority of employed mothers work part time as their way of managing WFC, an option not taken often by fathers (Charlesworth et al., 2011). Given the ways in which this 'one and a half employment' solution entrenches inequitable opportunities for mothers and fa thers to combine work and care (Ferree, 2010), we analyse mothers and fathers separately to identify gender patterning in the distri bution, determinants, and mental health consequences of WFC over time.

1.1. How stable is WFC for mothers and fathers?

Mid life (i.e. age 30–50 years) can be a point in the life course when WFC is common. This is a stage when family establishment and career development tend to intersect most. For employed parents, it is characterised by combining the practical, emotional and time intensive care of infants and children with building and stabilising careers. Thus parents with young and school aged chil dren (0–13 years) tend to experience greater WFC compared to parents of older children (Erikson et al., 2010; Higgins et al., 1994; Huffman et al., 2013).

While it is broadly accepted that WFC 'peaks' for parents of young children, few studies have investigated the extent to which WFC *changes* or becomes entrenched. Studies that have included (but were not exclusive to) parents indicate that, on average, WFC appears to be stable over time (Rantanen et al., 2012; Kelloway et al., 1999; Kinnunen et al., 2004; Knecht et al., 2011; Rantanen et al., 2008). For example, Westrupp et al. (Westrupp et al., 2015) reported relatively stable WFC among employed mothers from their child's infancy to age 9 years, with WFC at each time point consistently predicting subsequent conflict two years later.

However, within this general pattern of stability, recent evi dence suggests that there is a degree of heterogeneity in individual trajectories. Over a one year lag, Kinnunen (Kinnunen et al., 2004) found that 26% of employees reported persistent and high WFC, 50% reported minimal WFC, and the remainder reported either an increase (12% of men, 10% of women) or decrease (12% men, 10% women) in WFC. Analysing the trajectories of WFC over 14 years with a relatively small sample ($n < 500$), Rantanen et al. (Rantanen et al., 2012) found that 38% reported stable, low WFC; over half (55%) reported decreasing WFC and 5% reported increasing WFC. Together, this evidence suggests variability over time, with WFC being a chronic problem for some parents, yet intermittent, or episodic for others. These studies do not clarify which mothers and fathers are able to reduce their WFC or those for whom WFC be comes entrenched. The extent to which this is generalizable to varying policy contexts outside of Finland (e.g. Australia) is also unclear. Plausibly, given the gender inequities in work and care generated by the labour market, the 'opportunities' to reduce WFC, and the risks for persistent WFC, are likely to differ for mothers and fathers. We build on the existing evidence by testing this possibility.

Our first aim *(Study Aim 1)* is to describe the persistence or transitions in and out of WFC over five two year intervals, among mothers and fathers of children aged 4–13 years. Both *work to family* and *family to work* conflict have been documented in the research literature. Available evidence suggests that both are strongly related and interacting (Huang et al., 2004; Mesmer Magnus and Viswesvaran, 2005), albeit with some differences in antecedents and outcomes (Ruppanner and Pixley, 2012; Stevens et al., 2007). However, for the purposes of the present paper, our construct of WFC combines both dimensions together consistent with previous research (Cooklin et al., 2014a, 2014b; Westrupp et al., 2015).

1.2. Does change or stability in WFC affect parents' mental health?

The relationship between WFC and mental health appears reciprocal in nature: as a stressor, WFC erodes mental health (Goodman et al., 2009; Bakker et al., 2008; Grandey and Cropanzano, 1999), while poor mental health undermines the ca pacity to balance competing work and family demands (Weiss and Cropanzano, 1996; Carlson and Perrewe, 1999; Stoeva et al., 2002). Longitudinal studies support this notion of reciprocal negative in fluences (Westrupp et al., 2015; Innstrand et al., 2008; Steinmetz et al., 2008), described by Demerouti and colleagues as a 'loss spiral' (Demerouti et al., 2004). What is not known from previous research is whether, and to what extent, changes into or out of WFC shows corresponding changes to mothers and fathers mental health. Not only would this shed light on the nature and direction of the WFC – mental health relationship (Rantanen et al., 2012; Allen et al., 2000), it would yield important evidence about what po tential benefits a WFC intervention might deliver and for whom. Does an 'exit' or escape from WFC result in better mental health and is this evident for both mothers and fathers? Conversely, is mental health impaired when parents move (are conscripted) into WFC? Whose mental health is the most compromised, parents who enter WFC or those who are 'stuck' in chronic WFC? Plausibly, fathers who remain in WFC may be less affected than mothers as they may not place the same imperatives on caregiving and see less options for cutting back work (Humberd et al., 2015; Williams et al., 2013). Alternatively, new norms of fathering may locate fathers in com parable predicaments to mothers, and if this is the case, it would supply additional support for ensuring interventions and policies are focussed on parents, rather than mothers (Gatrell et al., 2015; Todd and Binns, 2013). We expect that, for both mothers and fa thers, any adverse effect on mental health will compound over time, leading to a 'loss spiral' in the Conservation of Resources model (Demerouti et al., 2004; Hobfall, 1989). Evidence that both mothers' and father's mental health is improved by relieving WFC could give a strong impetus for public policy and workplace in terventions to address it, as would evidence on the potential,

detrimental impacts from chronic conflict.

Our second aim *(Study Aim 2)* is to compare the effects of a change into, out of, or stability in WFC on mothers' and fathers' mental health. We specifically hypothesise that, for both mothers and fathers, when prior mental health is accounted for:

a. Moving into WFC is associated with an increase in psychological distress for both mothers and fathers
b. Moving out of WFC is associated with a decrease in psycholog ical distress for both mothers and fathers
c. Chronic WFC is associated with elevated psychological distress, and this group of parents will report a greater severity of distress relative to all other groups.

1.3. Gender, WFC and the drivers of stability or change

Although we argue that changes into, out of, or stable WFC are likely to compromise both mothers' and fathers' mental health, the mechanisms that drive change could be quite different. Different precipitants may produce WFC for mothers and fathers; different opportunities may be available to resolve them. What catalyses or ameliorates WFC for mothers? Are the same work and child factors important for both mothers and fathers? We examine a set of key work and family variables to answer this.

1.3.1. Work related factors

Although long *work hours* drive WFC for both mothers' and fa thers' (Eby et al., 2005; Goodman et al., 2011; Milkie et al., 2010), the 'thresholds' whereby mothers enter WFC may be much lower than fathers' thresholds. This is in order for them to manage the care load that is unable to be redressed by fathers. The prevailing 'one and a half' employment solution may mean mothers 'absorb' any increase in their *partners' work hours* by cutting back on what they do. Fathers may be less able to do so. Paradoxically, reduced or part time hours might place other pressures on mothers, especially those working in *high status occupations*. In these jobs, success increasingly depends on capacity to work intensively and invest extra time (O'Neill and O'Reilly, 2010) placing mothers in profes sional or managerial jobs at a distinct, time related disadvantage if they reduce hours, limiting career opportunities and adding to job pressures and demands (Stone and Hernandez, 2013). Capacity to manage WFC can further hinge on the quality of the job and the extent to which other conditions support parents. Parents who have flexibility and control over their workloads and schedules, and have access to paid family related leave are less likely to report WFC (Butts et al., 2013; Michel et al., 2011; Mesmer Magnus and Viswesvaran, 2006). Although fewer mothers relative to fathers work in high quality jobs with family friendly provisions (these are more readily available in higher status occupations) (Skinner et al., 2012), they are more likely to access and utilise these provisions when available (Skinner et al., 2012; Butts et al., 2013; Todd and Binns, 2013). Thus we expect poor *job quality* to be a particularly important determinant of mothers' WFC change or stability, but less so for fathers who face considerable disincentives (e.g. costs, stigma) to access these conditions.

1.3.2. Child related factors

The work related rigidity of fathers' time and availability, and the implicit targeting of mothers in 'family–friendly' work condi tions (Burnett et al., 2012; Todd and Binns, 2013) mean that when extra care needs are present, it is mothers who are most likely to try and accommodate them. We anticipate that mothers' WFC is therefore more sensitive to additional care burdens including having an *infant in the household*, a *child with special health care needs*, or a higher *number of children in the household*.

Our third aim *(Study Aim 3)* is to better understand gendered patterns in terms of which work and family characteristics are associated with changes (entering into) and stability in high WFC for mothers and fathers. Specifically, we expect:

a. Different *work hour* thresholds, with mothers predicted to have lower thresholds than fathers for entering into, and remaining in high WFC;
b. *Higher status occupations* to pose a stronger risk for mothers' (than fathers') WFC increases and stability;
c. *Job quality* to be a weaker driver of fathers' (than mothers') WFC increases and stability;
d. *More children*, *an infant in the household*, *having a child with special health care needs* are more likely to affect mothers' (but not fathers') WFC increases and stability;
e. Partner hours to affect fathers' (but not mothers) WFC increases and stability.

1.4. Key confounders

In order to ascertain the unique effects of change or stability in WFC on mental health, and the determinants of these changes from one wave to the next (two year lag), we consider a number of po tential confounders. Prior mental health potentially influences parents' subsequent mental health and therefore their experience of WFC. Similarly, parents' with chronic health problems are themselves more likely to have difficulty combining work with caregiving. A supportive couple relationship is a key resource for families, but within the relationship can drive WFC. Mental health, job quality and WFC varies by socio economic position (Perry Jenkins et al., 2011; Strazdins et al., 2013). Therefore, we adjust our analyses for *prior mental health*, *physical health*, *the quality of the couple relationship*, *and parent age*, *education*, *and income*.

2. Method

We address our three Study Aims using 5 waves of population cohort data from parents of young children (aged 4–5 to 12–13 years) participating in the Kindergarten (K) cohort of the Longitu dinal Study of Australian Children (LSAC). LSAC is a nationally representative study of parents' and children's health, well being and development approved by the Australian Institute of Family Studies Ethics Committee (Gray and Sanson, 2005; Soloff et al., 2005). Study design and methods are described in detail else where (Soloff et al., 2005). LSAC used a two stage cluster sampling, using Australian postcodes and the Medicare Australia database. This sample was broadly representative of all Australian families. Data collection began (Wave 1) in 2004 via face to face interview and a self report questionnaire by the parent who knew the child best (98.6% were the child's biological mother); partner/father data were also collected. Of the contactable children selected and residing in the sampled postcodes, 4983 took part in LSAC (59% response rate). Data were collected biennially. At Wave 1, children were aged 4–5 years, at Wave 5, 12–13 years. Two year lags to allow sufficient time for developments, either within the family, or the workplace to occur.

3. Inclusion criteria

For purposes of the paper, we limit the sample to mothers and fathers aged between 24 and 65 years (thereby excluding students, retirees) who were employed consecutively for 2 (or up to 5) waves. The total sample includes 2693 working mothers and 3460 working fathers. Due to attrition and sample selection criteria, and

employment transitions, the number of observations varies at each wave; overall, there were N 12,193 observations from mothers, and N 15,812 from fathers across five waves.

4. Measures

4.1. Work–family conflict

WFC was assessed using four items adapted from Marshall and Barnett's (Marshall and Barnett, 1993) measure of strains between work and family. Two items assess employment related constraints on family life and parenting ('Because of my work responsibilities, my family time is less enjoyable and more pressured' and 'Because of my work responsibilities, I have missed out on home or family activities that I would like to have taken part in') and two assess constraints from family responsibilities that affect work ('Because of my family responsibilities, the time I spend working is less enjoyable and more pressured' and 'Because of my family re sponsibilities, I have had to turn down work activities or opportu nities that I would prefer to take on'). Factor analyses established these 4 items (or only 3 available in Wave 2) load onto a single construct (Westrupp et al., 2015). Levels of response range from 1 (strongly disagree) to 5 (strongly agree). Responses were averaged for all available items in order to obtain a score of WFC. A cut off point of >3 was then applied to the average score to distinguish those who strongly/agreed (4 or 5) from those who somewhat or strongly/disagreed. Participants who strongly/agreed to 3 of the 4 items (or 2 of 3 items in Wave 2) were classified as 'high' WFC (versus low/no WFC).

4.2. Work–family conflict transitions

WFC transitions, across four two year intervals (Waves 1–2, 2–3, 3–4, and 4–5) were classified as *never*, *conscript*, *exit* or *chronic*. Those who were *low* WFC in the current wave were clas sified as either (i) *conscript* to (high) WFC if WFC status moved from *low* to *high* in the subsequent wave; or (ii) *never* facing (high) WFC if WFC remained *low*. Similarly, if WFC was *high* in the current wave, it was classified as either (iii) *chronic* (high) WFC if it remained *high* in the subsequent wave; or alternatively as (iv) *escape* from (high) WFC if reported as *low* in the subsequent wave. By construction, the reference category for *conscript WFC* was *never facing WFC* and the reference category for *chronic WFC* was *escape from WFC*. This yields two dichotomised 'adverse' transitional WFC variables: (i) *conscript* to WFC (yes/no) and (ii) *chronic* WFC (yes/no).

Parent psychological distress was assessed using the Kessler 6 item measure of general psychological distress (K6), which mea sures six non specific symptoms of distress and anxiety (Kessler et al., 2002). Parents' reported how often they felt each symptom (e.g. sad, nervous, worthless) from none of the time (0) to all of the time (Duxbury and Higgins, 2001). Responses were summed to give a continuous measure of distress (range 0–24) for each wave.

4.3. Work related factors

We classified the number of weekly *work hours* differently for mothers (<20 h; 20–40 h; >40 h) and fathers (<20 h; 20–40 h; >40–50 h; >50 h) to represent their different distributions. *Partner work hours* were similarly classified. *Occupational status* was clas sified using the AUSEI06 (McMillan et al., 2009) and used as a continuous variable (range 0–100), with higher scores indicating a more skilled/professional occupation. Parents' *job quality* was assessed using four indicators of job quality (Strazdins et al., 2007) and included: *job control* (0 strongly disagree to 5 strongly agree), *job security* (0 very insecure to 4 very secure), *flexibility* (0 certainly not to 4 certainly) and access to paid family related leave (yes, no). Responses to items and were averaged to create an index value, ranging from 0 (low quality) to 1 (high quality).

4.4. Child factors

We also adjusted for the *number of children* in the household, whether there was an *infant present in the family* (0 no infant, 1 an infant), and having a *child with special health care needs* (0 no, 1 yes).

4.5. Covariates

Socio demographic and health related factors. We include mothers' and fathers' *age* (24–34; 34–44; 44–65 years), and *edu cation* (tertiary/Bachelor Degree or higher versus no tertiary qual ification). *Equivalised household income* is the total household income (all sources) adjusted by applying an equivalence scale (weighted by household size, age/no. of children) to allow direct comparison of income between households of differing size and composition. In this study, *equivalised income* was calculated using the weightings from the Organisation for Economic Cooperation and Development modified equivalised scale (Hagenaars et al., 1994), and then categorised into quintiles (from 1 lowest in come to 5 highest income). We also adjust for *parents' health problems* using a 5 item physical health problem checklist (e.g. chronic pain, difficulty breathing). Total health problems were divided by maximum number (Oun, 2012) to give a mean score 0–1. *Prior mental health* was adjusted for, using the K 6 score from the wave immediately prior to the index transition. *Relationship quality* was assessed using one item: 'Which best describes the degree of happiness, all things considered, in your relationship?' yielding categorical responses (1 extremely unhappy to 7 perfectly happy).

Missing data is significant in the dataset. In every wave, at least 10% of respondents did not provide answers for 5% or more of selected variables. Compared to those with complete data, those with missing data were more distressed, more likely to report WFC, more likely to be socio economically disadvantaged (lower edu cation, fewer work hours, lower occupational status, poorer job quality) and to have a higher care burden (infant, more children, child with special health care needs). Data was therefore 'missing at random' and multiple imputation is appropriate (Little and Rubin, 1989; Rubin, 1996). We thus imputed using a chained regression procedure, which is recognised as a suitable approach for imputing incomplete large, national and public datasets (Royston and White, 2011; White et al., 2011). All model variables were included in the imputation analyses using one imputed dataset.

5. Statistical methods

The aims of this paper were to examine the effects of change or stability using the transitional WFC variable, on mothers' and fa thers' mental health; and to investigate work and family predictors of the onset of WFC (*conscript)* or ongoing *chronic WFC*. To do this, we use two stages of analysis, with all analyses adjusted for rele vant covariates.

In the first stage, as shown in equation (Greenhaus and Beutell, 1985) below (Study Aim 2), linear regressions are performed on the primary outcome of parents' mental health (Kessler 6 score) recorded at the last time point in each (two wave) transition. Separate models were run using each of the transitional WFC(*TWFC*) variables (conscript, chronic) as the main predictor, with adjustment for all covariates (*X*). This approach allows us to investigate the variations to parents' mental health, in either

direction, that correspond with transitions into or out of WFC.

In the second stage, as shown in equation 2 (Erikson et al., 2010) below (Study Aim 3), we look at the determinants of each of the two adverse transitional WFC (conscript, chronic) outcomes. In the first set of analyses we directly compare the characteristics of mothers or fathers who are conscripted into high WFC with those who remain low, and in the second set of analyses we compare the characteristics of those who have consistent high WFC with those who escape to a lower degree. We use logit regressions for the binary outcomes. $X_{i,t}$ includes socio economic and health , work , children and partner related factors. $Z_{i,t}$ does not include health related variables but includes socio economic, work child and partner factors.

$$MH_{i,t} \quad \propto_0 + \propto_{1i} + \propto_{2t} t + \propto_3 MH_{i,t-1} + \propto_4 TWFC_{i,t} + \propto_5 X_{i,t} + u_{i,t} \tag{1}$$

$$\Pr(TWFC_{i,t} \quad 1 | t, Z_{i,t}) \quad \frac{\exp(\beta_0 + \beta_{1i} + \beta_{2t} t + \beta_3 Z_{i,t} + v_{it})}{1 + \exp(\beta_0 + \beta_{1i} + \beta_{2t} t + \beta_3 Z_{i,t} + v_{it})} \tag{2}$$

In all analyses, we control for the time specific effects(t) and individual specific time invariant effects, $\propto_{1i}$ for mental health and β_{1i} for transitional WFC, using random effect regression models. These enable us to estimate both within and between individual effects, whereas fixed effects models only examine within individual effects (Woolridge 2002). Some predictors (e.g. education, income level, number of children) vary greatly between individuals, but have little variation over time for each individual, so fixed effects estimates will be imprecise and have large standard errors. Using a random effects approach, we therefore capture variation in covariates that may vary across waves within and between individuals (e.g. number of children, working hours). All analyses are stratified by gender.

Given limited space, detailed regression analysis results are omitted (including estimates for adjusted covariates) but are available from authors on request. Analyses were conducted using the STATA SE statistical software package version 13 (Statacorp, 2013).

6. Results

Sample characteristics for mothers, fathers and for each of the WFCT categories are presented in Table 1. Compared to employed fathers employed mothers were more likely to be younger, with higher educational attainment, employed fewer hours in a higher status occupation, with overall higher job quality and income, although with fewer children, and a less satisfied couple relationship. This reflects the Australian pattern where most fathers are employed, but employed mothers comprise a socio economically advantaged sub sample of the population (Westrupp et al., 2015; Baxter, 2005).

6.1. Persistency and change in WFC (aim 1)

Our first aim was to describe the persistence and change in mothers and fathers WFC over five two year intervals.

Of the total number of observations for mothers (N 12,193, 5 waves), there were n 9171 WFC transitions recorded (from waves 2–5). Of these, 12.1% (n 1108) moved into or were conscripted into WFC, 13.8% (n 1266) moved out of or escaped from WFC, 14.5% (n 1332) reported chronic WFC, and the remainder (59.6%, n 5465) reported no WFC at any wave.

For fathers (N 15,812 observations, 5 waves) there were n 11,283 transitions recorded (waves 2–5). Fourteen percent of father observations showed a transition into (conscript) WFC (conscript n 1656), 16% (n 1832) an escape from WFC, with 13% (n 1541) reported consistent, stable WFC. Fifty five percent (n 6254) of fathers reported no WFC at any time point.

6.2. Effect of WFC change, stability on mental health (aim 2)

Table 2 presents the (fully adjusted) K6 mean psychological distress scores for each WFC transition status stratified by gender. The interaction term between *persistent* WFC and gender (male) was significant ($p < 0.05$) in this model.

Hypotheses 2 a, b and c were supported. Compared to people who never experienced WFC, those who were conscripted to WFC reported an increase in Kessler 6 score by 0.84 (se 0.11, $p < 0.001$) for mothers and by 0.75 (se 0.10, $p < 0.001$) for fathers (Hypothesis 2a). Notably, those who escaped WFC reported a decrease in their mean K6 score by 0.43 (se 0.14, p 0.002) for mothers and by 0.73 (se 0.13, $p < 0.001$) for fathers (Hypothesis 2b). Those with chronic WFC between 2 waves reported the highest psychological distress (for mothers, mean 3.64, se 0.09; for fathers, mean 3.65, se 0.10, Hypothesis 2c). Finally, those who reported no WFC across all waves reported the lowest K 6 scores (for mothers, mean 2.18, se 0.04; for fathers, mean 2.19, se 0.04).

For both mothers and fathers, prior poor mental health, chronic health conditions, poor job quality, a poor quality partner relationship, and low income were associated with higher K 6 scores (poorer mental health). For fathers, younger paternal age (<34 years), long work hours (40–50, 50 + hours/week), and having a tertiary qualification were also associated with poorer mental health. For mothers, having a child with special health care needs was the only additional covariate associated.

6.3. What predicts the onset of WFC? (aim 3)

Study Aim 3 was to investigate the drivers of WFC change or stability for mothers and fathers. Results reported in Table 3 show the association between work and child characteristics and the (adjusted) probabilities of mothers and fathers moving into WFC (conscripted), compared to those who remain with no WFC at two consecutive waves.

The probabilities of conscripting to WFC increased with each hour threshold (i.e. 20–40, 40–50 h), in a similar pattern for mothers and fathers, rather than in different patterns as hypothesised (3a). For mothers (but not fathers), a high occupational status was significantly associated with a higher probability of conscripting to WFC, compared to those with a low skilled occupation; for each increase in occupational status, parents were 8% more likely to conscript into WFC (Hypothesis 3b). Reporting a low quality job, compared to a high quality job reduced the probability of conscripting into WFC for mothers and fathers, not supporting Hypothesis 3c that job quality would be salient for mothers, but not fathers. Mothers, with security, autonomy, and flexibility were 16.10%, 10.50% and 3.5% less likely to be recruited to WFC, but family related leave was not significant. Results were similar for fathers, but those with paid family related leave were nearly 3% less likely to conscript to WFC.

Of the family characteristics tested, there was some support for Hypothesis 3d. Having an infant was the only significant determinant associated with mothers' entry into WFC; number of children, or having a child with special health care needs were not significant. For fathers, none of the family characteristics were associated with moving into WFC, although having a child with special health

Table 1
Socio-demographic, economic and health-related characteristics of respondents by type of WFC transition.

	Total sample		P-value	Mothers (N 2693)				Fathers (N 3460)			
	Mothers	Fathers		Never	Conscript	Escape	Persist	Never	Conscript	Escape	Persist
Own characteristics											
Age (%)											
From 24 to 34 years old	7.3	5.4	<0.001	7.4	7.9	8.4	5.0	5.5	5.6	5.1	5.5
From 34 to 44 years old	64.0	52.4		65.0	63.2	64.2	60.3	51.7	53.9	52.5	53.5
From 44 and more	28.8	42.2		27.6	29.0	27.4	34.7	42.8	40.5	42.5	40.9
Having at least one tertiary qualification (%)	89.7	88.8	0.030	88.3	90.9	90.8	93.6	88.9	87.6	87.5	91.0
Health problems index (0 1)	0.046	0.053	0.020	0.0223	0.0191	0.0192	0.0189	0.0204	0.0183	0.0184	0.0184
Having a mental health problem	7.1	7.2	0.659	4.1	11.2	8.4	14.7	4.3	10.3	7.1	15.5
Number of work hours (%)											
Less than 20 h/week	29.0	1.6	<0.001	32.0	24.2	31.8	17.8	1.8	1.4	1.4	1.4
From 20 to 40 h/week	59.1	43.1		58.4	61.4	55.5	63.0	46.9	39.6	41.0	33.5
From 40 to 50 h/week	8.3	30.4		6.5	10.0	8.7	13.6	30.2	32.1	29.6	30.1
More than 50 h/week	3.7	25.0		3.0	4.5	4.0	5.6	21.2	26.9	27.9	35.0
Occupational status index (0 100)	56.8	53.9	<0.001	53.29	53.49	53.56	52.80	50.77	51.94	51.85	51.46
Job security											
Very insecure	1.5	1.1	<0.001	1.1	2.8	1.2	2.3	0.7	1.6	1.1	2.3
Not very secure	8.5	9.7		5.8	11.7	9.2	16.4	7	12.6	9.8	17.1
Secure	42.3	47.4		39.4	47.6	45.6	46.6	45.1	52.3	47.4	51.6
Very secure	47.7	41.9		53.7	37.9	44	34.7	47.3	33.5	41.6	29.1
Job autonomy											
Strongly disagree	3.9	2.4	<0.001	2.7	6.1	4.9	5.9	1.7	3.6	2.5	4
Disagree	12.3	9.2		10.5	14.6	13.1	16.6	7.4	12.5	10.2	12.5
Neither agree nor disagree	17.9	14.3		16.8	20.1	19.1	19.3	12.6	15.4	15.6	18.5
Agree	41.1	43.8		42.1	40.8	40.2	38.2	44.9	41.2	44.9	41.2
Strongly agree	24.9	30.2		27.8	18.4	22.7	19.9	33.4	27.4	26.8	23.8
Job flexibility											
Certainly	54.9	58.9	<0.001	58	46.7	54.4	49.3	63.5	51.8	56.5	50.5
Likely	30.0	28.1		28.9	33.3	29.6	31.8	26.4	29.2	29.8	31.5
Likely not	8.8	7.6		7.7	10.9	9.3	10.8	6.1	11.7	8.3	8.7
Certainly not	6.4	5.5		5.4	9.1	6.7	8.1	4	7.4	5.4	9.4
Having family-related leave	56.4	61.2	<0.001	54.7	57.5	55.2	63	60.8	61.1	61.8	62
Family characteristics											
Equivalised income (%)											
1st quintile	8.9	10.9	<0.001	9.0	9.3	9.2	7.8	10.1	13.0	10.9	11.7
2nd quintile	17.2	19.5		18.1	16.9	17.4	13.2	19.6	19.0	20.3	18.9
3rd quintile	22.8	22.2		23.5	23.0	22.8	20.2	22.5	23.1	22.5	20.1
4th quintile	25.2	23.4		25.6	22.8	24.8	26.4	23.6	23.8	22.9	23.3
5th quintile	25.9	23.9		23.8	28.0	25.9	32.5	24.3	21.1	23.4	26.1
Number of children	2.5	2.6	<0.001	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.7
Having an infant (%)	5.0	7.3	<0.001	4.4	7.9	5.4	4.7	7.2	7.8	6.4	8.2
Having a child with special health care needs (%)	12.3	12.9	0.225	10.9	12.9	14.2	15.8	11.6	14.2	13.7	15.9
Quality of couple relationship											
Extremely unhappy	3.8	0.8	<0.001	4.2	3.1	4.1	2.8	0.9	0.4	0.8	0.6
Fairly unhappy	3.8	1.4		3	5	5	5	1	2	1.3	2.5
A little unhappy	5.7	4.4		3.9	7	5.9	11.7	2.6	6.8	4.6	8.5
Happy	14.6	13.9		11.8	16.8	15.1	23.5	10.2	19.6	16.2	20
Very happy	27.6	27.9		26.7	28.4	29.8	28.3	26.6	30.3	27.6	31.1
Extremely happy	34.8	39.2		39.4	31.5	30.4	23	44.1	31.9	36.5	30.1
Perfectly happy	9.7	12.4		11	8.3	9.8	5.7	14.5	9	13	7.2
Partner's number of work hours (%)											
Less than 20 h/week	4.8	44.5	<0.001	4.7	4.7	4.8	5.1	42.9	46.2	44.4	49.2
From 20 to 40 h/week	42.0	46.3		42.1	41.2	40.1	44.2	47.7	45.0	47.0	41.3
From 40 to 50 h/week	29.3	6.4		29.5	28.5	29.6	29.1	6.6	6.4	5.4	6.5
More than 50 h/week	23.9	2.8		23.7	25.7	25.4	21.6	2.8	2.4	3.2	3.0
Number of observations[a]	9171	11,283		5465	1108	1266	1332	6254	1656	1832	1541

[a] 'Observation' is a WFC transition over a pair of waves.

Table 2
Mean level of Kessler 6-item psychological distress score (K6) by TWFC status, adjusted for covariates[a].

TWFC	Mothers					Fathers				
	Mean	SE	Diff.	SE	p-value	Mean	SE	Diff.	SE	p-value
Never[b]	2.18	(0.04)				2.19	(0.04)			
Conscript	3.02	(0.10)	0.844	(0.11)	0.000	2.94	(0.09)	0.75	(0.10)	0.000
Escape[b]	3.21	(0.10)				2.92	(0.08)			
Persistent	3.64	(0.09)	0.430	(0.14)	0.002	3.65	(0.10)	0.73	(0.13)	0.000

Note: [a] Adjusted covariates include prior mental health, education, health problem index, age group, income group, number of weekly work hours, job quality, occupation status, relationship satisfaction, having a child with special health care needs and partner's number of work hours;[b] The reference category.

Table 3
Predicted probability of mother's and father's conscript WFC[a] by key predictors, adjusted by covariates[b].

	Mothers					Fathers				
	Mean (%)	(SE)	Diff.	(SE)	p-value	Mean (%)	(SE)	Diff.	(SE)	p-value
Work-related factors										
Number of work hours[c]										
Less than 20 h/week[d]	4.60	(0.77)				5.86	(2.86)			
From 20 to 40 h/week	10.10	(1.01)	5.48	(0.93)	0.000	9.87	(0.91)	4.00	(2.83)	0.157
From 40 to 50 h/week	16.40	(2.56)	11.80	(2.44)	0.000	13.80	(1.18)	7.98	(2.93)	0.007
More than 50 h/week						21.40	(1.78)	15.50	(3.21)	0.000
Occupational status index (0 100)[e]	8.19	(0.84)	0.08	(0.03)	0.002	12.90	(0.85)	0.02	(0.03)	0.469
Job security										
Very insecure[d]	22.40	(6.77)				31.60	(9.73)			
Not very secure	18.60	(3.13)	−3.77	(8.08)	0.641	18.90	(2.60)	−12.70	(9.57)	0.184
Secure	11.20	(1.19)	−11.10	(7.67)	0.146	15.70	(1.13)	−15.90	(9.37)	0.090
Very secure	6.23	(0.78)	−16.10	(7.66)	0.035	9.72	(0.90)	−21.90	(9.39)	0.020
Job autonomy										
Strongly disagree[d]	16.50	(3.75)				24.30	(5.18)			
Disagree	11.90	(1.86)	−4.61	(3.97)	0.245	17.70	(2.36)	−6.63	(5.75)	0.249
Neither agree nor disagree	9.27	(1.42)	−7.25	(3.83)	0.058	13.80	(1.70)	−10.50	(5.57)	0.058
Agree	9.20	(1.03)	−7.32	(3.76)	0.051	12.20	(1.00)	−12.10	(5.46)	0.026
Strongly agree	6.01	(0.94)	−10.50	(3.79)	0.006	12.40	(1.17)	−11.90	(5.52)	0.031
Job flexibility										
Certainly[d]	7.49	(0.89)				11.40	(0.92)			
Likely	9.88	(1.21)	2.39	(1.16)	0.039	14.40	(1.32)	3.03	(1.37)	0.027
Likely not	12.10	(2.13)	4.65	(2.08)	0.025	20.40	(2.79)	9.02	(2.80)	0.001
Certainly not	11.00	(2.18)	3.50	(2.34)	0.134	20.20	(3.36)	8.86	(3.44)	0.010
Having family-related leave										
No[d]	8.77	(1.09)				11.20	(1.08)			
Yes	8.58	(0.96)	−0.19	(1.10)	0.863	14.10	(1.00)	2.89	(1.23)	0.019
Children-related factors										
Number of children[e]	8.15	(0.87)	1.18	(0.62)	0.058	13.00	(0.92)	−0.06	(0.68)	0.934
Having an infant										
No[d]	8.37	(0.84)				13.00	(0.86)			
Yes	18.70	(3.98)	10.30	(3.83)	0.007	13.20	(2.18)	0.16	(2.16)	0.940
Having a child with special health care needs										
No[d]	8.51	(0.86)				12.60	(0.86)			
Yes	9.95	(1.77)	1.44	(1.68)	0.390	16.40	(1.96)	3.79	(1.93)	0.049
Partner-related factors										
Partner's number of work hours[c]										
Less than 20 h/week[d]	7.79	(2.18)				13.10	(1.08)			
From 20 to 40 h/week	8.11	(1.00)	0.32	(2.17)	0.882	12.90	(1.03)	−0.19	(1.21)	0.875
From 40 to 50 h/week	9.45	(1.14)	1.66	(2.27)	0.463	12.90	(2.02)	−0.17	(2.10)	0.937
More than 50 h/week	8.91	(1.24)	1.12	(2.31)	0.628					
Quality of couple relationship										
Extremely unhappy[d]	5.59	(1.80)	−8.39	(2.50)	0.001	5.83	(3.79)	−19.10	(4.48)	0.000
Fairly unhappy	18.60	(4.16)	4.59	(4.51)	0.309	24.80	(7.55)	−0.18	(7.43)	0.981
A little unhappy	16.00	(3.08)	2.07	(3.58)	0.563	37.10	(5.10)	12.10	(5.36)	0.024
Happy	14.00	(1.90)				25.00	(2.40)			
Very happy	9.18	(1.20)	−4.79	(2.00)	0.017	14.40	(1.28)	−10.60	(2.48)	0.000
Extremely happy	6.64	(0.88)	−7.33	(1.95)	0.000	10.50	(0.96)	−14.50	(2.40)	0.000
Perfectly happy	7.64	(1.51)	−6.33	(2.27)	0.005	8.06	(1.19)	−16.90	(2.53)	0.000

Notes: [a] Reference category *no WFC*; [b] Adjusted covariates include age group, education level and income group and health problem index; [c] For mothers, work hour categories (40 50 and +50) are collapsed into one category; [d] The reference category; [e] The predicted probability of conscript WFC is estimated at the mean value of the continuous predictor; *, **: Significance levels at 5% and 1%, respectively.

care needs was approaching significance (16.4% versus 12.6%, p 0.05). Higher partner work hours were not significant predictors of the onset of WFC for mothers or fathers, not supporting Hypothesis 3e.

A high quality couple relationship (very/extremely/perfectly happy) was protective against conscripting into WFC for mothers and fathers. For fathers, low income was also predictive of entry into WFC.

6.4. What factors sustain chronic WFC?

Results reported in Table 4 are the (adjusted) probabilities of work and child characteristics of mothers and fathers who have chronic WFC across two waves, compared to those who move out of (escape) WFC by the next wave.

For mothers, longer work hours (>20/week) distinguished those with chronic WFC from those who escaped, further supporting Hypothesis 3a. For fathers, only very long hours (>50 h/week) was associated with persistent WFC. Employment in a high status occupation was significantly associated with chronicity for both genders (counter to Hypothesis 3b).

Only job security was associated with persistent WFC for mothers, but not autonomy, flexibility or family related leave (counter to Hypothesis 3c). For fathers, all aspects of job quality, with the exception of family related leave were significantly protective against persistent WFC.

Partially supporting Hypothesis 3d, having more children (but not with additional needs, or having an infant) was associated with chronic WFC for fathers, but not mothers. Partner work hours were not significantly different between the 'escape' versus 'chronic' groups, for mothers or fathers (partially supporting Hypothesis 3e).

Of the covariates, supportive couple relationship and low

Table 4
Predicted probability of mother's and father's persistent WFC[a] by key predictors, adjusted by covariates [b].

	Mothers					Fathers				
	Mean (%)	(SE)	Diff.	SE	p-value	Mean (%)	(SE)	Diff.	(SE)	p-value
Work-related factors										
Number of work hours[c]										
Less than 20 h/week[d]	37.30	(3.48)				49.10	(14.10)			
From 20 to 40 h/week	52.30	(2.22)	15.00	(3.95)	0.000	37.40	(2.47)	−11.70	(12.50)	0.352
From 40 to 50 h/week	64.70	(3.76)	27.40	(5.17)	0.000	46.40	(2.55)	−2.65	(12.60)	0.833
More than 50 h/week						58.20	(2.72)	9.16	(12.60)	0.468
Occupational status index (0 100)[e]	46.30	(2.06)	0.42	(0.09)	0.000	44.70	(1.72)	0.28	(0.08)	0.000
Job security										
Very insecure[d]	76.80	(9.66)				57.70	(11.20)			
Not very secure	67.40	(4.07)	−9.35	(10.10)	0.357	64.20	(3.65)	6.42	(11.30)	0.571
Secure	53.20	(2.46)	−23.60	(9.77)	0.016	48.80	(2.19)	−8.90	(11.00)	0.417
Very secure	42.10	(2.80)	−34.70	(9.98)	0.001	36.30	(2.43)	−21.40	(11.00)	0.052
Job autonomy										
Strongly disagree[d]	54.60	(6.74)				62.70	(7.45)			
Disagree	55.80	(4.25)	1.21	(7.72)	0.876	46.50	(4.33)	−16.20	(8.16)	0.046
Neither agree nor disagree	50.40	(3.71)	−4.20	(7.52)	0.576	51.80	(3.41)	−10.90	(7.94)	0.169
Agree	50.20	(2.60)	−4.43	(7.15)	0.535	42.30	(2.32)	−20.40	(7.64)	0.008
Strongly agree	49.40	(3.68)	−5.24	(7.64)	0.493	47.20	(3.07)	−15.60	(8.01)	0.052
Job flexibility										
Certainly[d]	50.90	(2.56)				43.00	(2.28)			
Likely	52.00	(2.98)	1.15	(3.83)	0.764	50.00	(2.66)	6.95	(3.37)	0.039
Likely not	49.20	(5.26)	−1.71	(5.51)	0.757	44.50	(5.01)	1.49	(5.23)	0.776
Certainly not	51.90	(6.04)	1.07	(6.46)	0.869	57.50	(5.07)	14.40	(5.76)	0.012
Having family-related leave										
No[d]	48.70	(2.94)				47.40	(2.69)			
Yes	52.70	(2.26)	4.02	(3.72)	0.280	45.80	(2.03)	−1.52	(3.27)	0.643
Children-related factors										
Number of children[e]	49.50	(2.03)	3.50	(2.01)	0.082	44.00	(1.92)	4.16	(1.68)	0.013
Having an infant										
No[d]	51.40	(1.83)				46.30	(1.68)			
Yes	45.50	(6.98)	−5.92	(7.20)	0.411	46.70	(5.51)	0.35	(5.62)	0.950
Having a child with special needs										
No[d]	50.60	(1.93)				45.20	(1.76)			
Yes	54.30	(4.05)	3.72	(4.46)	0.404	53.00	(3.76)	7.79	(4.08)	0.056
Partner-related factors										
Partner's number of work hours[c]										
Less than 20 h/week[d]	56.60	(7.56)				45.80	(2.34)			
From 20 to 40 h/week	52.00	(2.60)	−4.59	(7.85)	0.559	46.60	(2.34)	0.82	(3.12)	0.792
From 40 to 50 h/week	50.60	(2.95)	−5.94	(8.13)	0.465	48.30	(4.77)	2.52	(5.31)	0.635
More than 50 h/week	49.10	(3.57)	−7.49	(8.27)	0.365					
Quality of couple relationship										
Extremely unhappy[d]	50.60	(8.51)	−13.80	(9.10)	0.130	45.00	(16.40)	−7.85	(16.30)	0.630
Fairly unhappy	45.50	(6.99)	−18.80	(7.62)	0.013	66.30	(9.13)	13.50	(9.49)	0.156
A little unhappy	70.70	(4.69)	6.36	(5.55)	0.252	63.10	(5.60)	10.30	(6.12)	0.092
Happy	64.40	(3.30)				52.80	(3.36)			
Very happy	49.20	(3.06)	−15.10	(4.41)	0.001	51.20	(2.59)	−1.62	(4.09)	0.693
Extremely happy	43.20	(2.96)	−21.20	(4.52)	0.000	40.40	(2.54)	−12.40	(4.08)	0.002
Perfectly happy	34.10	(4.95)	−30.30	(6.11)	0.000	29.20	(3.72)	−23.70	(5.01)	0.000

Notes: [a] Reference category *escape* WFC; [b]Adjusted covariates include age group, education level, income group and health problem index; [c] For mothers, work hour categories (40 50 and +50) are collapsed into one category; [d] The reference category; [e] The predicted probability of conscript WFC is estimated at the mean value of the continuous predictor; *, ** Significance levels at 5% and 1%, respectively.

middle income were the only additional factors protecting against chronic WFC for mothers. A supportive couple relationship was protective for fathers.

7. Discussion

WFC occurs when work and care demands are incompatible. It creates dilemmas for parents, which, the current study shows, are equally corrosive for mothers' and fathers' mental health. We used five waves of data from a nationally representative cohort of employed Australian mothers and fathers to identify changes and stability in WFC and determine the effects on parents' mental health. Typically seen as a problem for mothers, our findings contribute to the growing evidence that fathers are also vulnerable to WFC and its negative health consequences (Allen and Finkelstein, 2014; Cooklin et al., 2014a; Milkie et al., 2010; Allard et al., 2011). Importantly, we approach this using a gender 'lens', unpacking the different risks and opportunities that mothers and fathers have in the workforce that increase the likelihood of entering and becoming entrenched in WFC.

Significant heterogeneity in parents' WFC, over five two year intervals, was observed, lending weight to emerging evidence that has described significant heterogeneity in individual trajectories of WFC (Rantanen et al., 2012; Kinnunen et al., 2004). Transitions into, and out of WFC was common for mothers and fathers (between 12 and 16% for each transition 'type'), similar to rates reported in a Finnish sample Kinnunen et al., 2004. What effect did these transitions have on parents' mental health? We found a comparable, graded effect for mothers and fathers, supporting our hypotheses (2 a, b, c). Parents who 'got trapped' in chronic WFC reported the poorest mental health, followed by those who reported an onset of WFC. Mothers and fathers who 'never'

experienced WFC showed the most optimal mental health scores, and experienced the fewest symptoms of psychological distress. Moving into WFC corresponded with deteriorating mental health, confirming the few prior studies that have shown similar findings {Kinnunen et al., 2004 #1521). Notably, we also found that when WFC was relieved, both mothers' and fathers' mental health improved significantly. This is a novel contribution; very few studies have included the necessary design elements to analyse the effects of a reduction or resolution in WFC on parents' mental health (Casper et al., 2007).

Together, these findings provide evidence about the manner in which the WFC interface affects health outcomes. While evolving conceptualisations of WFC pose different models describing the direction of the relationship between WFC and mental health (Goodman et al., 2009; Stoeva et al., 2002; Demerouti et al., 2004), emerging longitudinal evidence conceptualises the relationship as bi directional (Nohe et al., 2014). Our findings suggest that changes to WFC, in either direction, pre empt corresponding changes to mothers' *and* fathers' mental health. The prevention or ameliora tion of WFC protects and promotes mental health for parents, and likely prevents the compounding of adverse effects over time in a 'loss spiral' (Demerouti et al., 2004). Irrespective of causal path, relieving WFC strains for parents appears to be effective in improving mental health.

Given the gendered nature of parents' participation in the workforce, we hypothesised different patterns of risks and 'op portunities' for mothers and fathers to prevent, manage, or relieve WFC. Some support for this was evident. While long work hours determined fathers' entry into WFC, only very long hours (>50/ week) were associated with persistent WFC; those working fewer than 50 h 'escaped' WFC. Fathers' work hours, particularly in Australia, are universally long and arguably this is normative, making it difficult for fathers to reduce or limit their working hours (Charlesworth et al., 2011; Gatrell et al., 2015). Instead it was working in a high quality job that differentiated fathers who 'left' WFC from those who became 'stuck'. A high quality job, charac terised by combinations of flexible work arrangements, job security and autonomy was protective against persistent, chronic WFC for fathers. Our findings suggest that fathers' opportunities to avoid the adverse health effects conveyed by ongoing WFC hinge on the quality of their jobs, even while performing long working hours. This confirms that prior evidence, consistently linking poor job quality to work–family conflict for all adults, is also salient to fa thers of young children (Michel et al., 2011; Kelly et al., 2011). Conversely, paid family related leave was not associated with persistent WFC for fathers, although it did prevent entry into WFC. This perhaps indicates that access to paid leave is useful 'episodi cally', but does not on its own ameliorate the adverse effects of long hours, high workloads or a high burden of care.

Conversely for mothers, while job quality predicted mothers' entry into WFC, only job insecurity and long work hours sustained WFC. Mothers who were employed for 20–40, or 40–50 h per week were nearly 15.0% and 27.4% more likely to report chronic WFC respectively than those working fewer than 20 h. The demand for fathers' long hours means that mothers' hours by necessity are low, at worst pushing women 'down and out' of the labour force (Charlesworth et al., 2011; Cha, 2010). Mothers are more likely to curtail their workforce participation to meet the needs of children, and in Australia, the majority of mothers work part time (Cha, 2010; Maume, 2006). The gender gap in earnings may be impli cated here. To redress WFC, employed couple families may priori tise men's paid work as it is more efficiently and better remunerated than women's (Charlesworth et al., 2011; Holt and Lewis, 2011). This has ongoing implications for women's lifetime earnings and their financial security. Our results indicate that job security is also salient here; secure remuneration and commitment from an employer may ameliorate some of the 'opportunity costs' inherent in combing work with caregiving.

Within this inequity, our findings provide further evidence that increasing mothers' work hours creates a 'care gap', which likely heightens work–family conflict, with corresponding mental health consequences. However, partner work hours were not relevant to either mothers' or fathers' own WFC. Previous research has also found little evidence of cross over effects between partners' WFC in couple families (Kinnunen et al., 2010). This is evidence for the continuing 'separate spheres', whereby one's WFC is only affected one's own hours or job quality, rather than that of a partner (Cha, 2010).

Mothers and fathers in high status occupations were at higher risk of conscripting into, and reporting chronic WFC. Over and above time demands, high status occupations convey other de mands including intensive workloads, high commitment and ex pectations about availability for which there may be remuneration and rewards (e.g. career advancement), but that also place strains on families. Demanding jobs confer behavioural, cognitive, emotional and time based strains that may make it harder for parents to sustain family needs and care when jobs are all consuming.

The pattern of family based risks was different for mothers and fathers, in ways that were somewhat inconsistent with our hy potheses. For mothers, family factors (no. of children, child with special health care needs) were not significant risk factors for either conscripting to, or chronic, WFC with the exception of having an infant in the household which was associated with conscription into WFC. The postpartum is a critical transition stage for families requiring new adjustments and new routines coupled with fatigue, physical symptoms and intensive care demands (Grice et al., 2008, 2011). It makes sense that once the child moves into toddlerhood, some demands are relieved (e.g. maternal fatigue, physical symp toms) and new routines are mastered (e.g. childcare and child sleep established). Together, these findings suggest that, outside of caring for an infant, mothers may have already 'absorbed' or 'accommo dated' other additional family care burdens (i.e. more children, special needs) with part time work, pre empting WFC such that these factors were not associated with WFC transitions. For fathers, as anticipated, number of children, having an infant, or a child with special health care needs were not associated with moving into work–family conflict. This provides further evidence that while fathers' time and availability is 'fixed' to the paid workforce, mothers by necessity manage the unpaid caring workload, rein forcing 'separate spheres' (Cha, 2010). However, fathers who had more children were more likely to have chronic work–family conflict. This is likely a reflection of the burden of care required for each child in the household, compounding fathers' WFC.

8. Strengths and limitations

Our study has notable strengths. We combine multiple waves of data, for both mothers and fathers, from a contemporary popula tion cohort broadly representative of employed Australian parents and their children. We adjust for prior wave mental health to strengthen the likelihood that we are reporting a temporal rela tionship between change or stability in WFC and subsequent mental health outcomes. Our analyses control for both within and between individual fluctuations, across waves, in key confounding variables likely to influence WFC and mental health. Multiple imputation was used to overcome some of the biases conveyed by selective attrition over the study intervals.

We acknowledge several limitations. We use parent report data of independent and dependent variables and thus may over

estimate the association between mental health and WFC. We simultaneously adjust our analyses for income, education which are in turn likely to be associated with another covariate, job quality. Our results may therefore under estimate some effects due to this potential 'over adjustment' via the addition of overlapping cova riates. We dichotomised WFC to capture 'large' transitions, but acknowledge that incremental changes in WFC are not captured here. Our WFC transitions are captured across four, separate, two year intervals. While this approach maximises the number of WFC transitions observed, more persistent or more transient, faster episodes of WFC are not captured, nor are the mental health con sequences, which are likely to compound. The measure of WFC available in LSAC incorporates items assessing family to work and work to family conflict. While used here as one overall WFC construct, future research investigating change, stability or pre dictors of each sub dimension, for mothers and fathers, is war ranted. Our sample is broadly representative of employed Australian parents, but under represents sole parents, those born overseas, and those living in rental accommodation (Soloff et al., 2005). These parents are likely to face the poorest job conditions, with fewer opportunities to prevent or ameliorate WFC, so the mental health outcomes of these families may be worse. Further research is needed in more diverse samples of parents not repre sented here.

9. Conclusions

This study is one of the first to demonstrate that WFC influences mental health outcomes temporally, such that improving or resolving WFC improves parents' mental health. Findings confirm that mental health is directly influenced by the WFC interface, and adds weight to calls for policies and workplaces to respond to WFC as a key social determinant of health. The current study identifies possible pathways into, and out of WFC, for both mothers and fa thers. For mothers, long hours, a skilled occupation and poor job quality predicted WFC, and long hours, job insecurity and a skilled occupation sustained it. For fathers, long hours and poor job quality were risks for WFC; a high skilled occupation, very long hours, with poor job quality sustained it. Together, these findings inform the ways in which workplaces *can* respond to WFC, offering the basis for prevention and intervention initiatives tailored for mothers and fathers most effectively.

These findings reflect the ongoing, persistent, gendered nature of work and care shaped by institutions, in this case, workplaces. The risks parents face, and their opportunities to pre empt or resolve WFC continue to be shaped by gendered expectations about the roles of mothers and fathers, both at work and in the family. The gender gap in pay may be implicated here – couple families may be responding to work–family conflict by prioritising fathers' paid work which generally draws higher income than mothers' paid work. Finally, we add important evidence to indicate that along with the benefits of jobs for families (e.g. access to income, re sources, social capital), the deficits conferred by the failure of workplaces and policy to respond to mothers and fathers' care giving responsibilities are far reaching, measurably shaping chil dren's home environments.

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Parents' transitions into and out of work-family conflict and children's mental health: Longitudinal influence via family functioning

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ABSTRACT

The demands arising from the combination of work and family roles can generate conflicts (*work-family conflicts*), which have become recognized as major social determinants of mothers' and fathers' mental health. This raises the question of the potential effects on children. The current study of 2496 Australian families (7652 observations from children aged 4–5 up to 12–13 years) asks whether changes in children's mental health corresponds with changes in mothers' and fathers' work-family conflicts. Using longitudinal random-effect structural equation models, adjusting for prior child mental health, changes in work-family conflict were examined across four adjacent pairs of biennial data waves. Children's mental health deteriorated when their mother or father experienced an increase in work-family conflict, but improved when parents' work-family conflict reduced. Results held for mothers, fathers and couples, and the key pathways appear to be changes in children's relational environments. These results contribute new evidence that conflicts between the work-family interface are powerful social determinants of mental health which have an intergenerational reach.

1. Introduction

The intersection between work and family life the *work family interface* represents the interaction between two of the most important social domains in adults' lives. There now exists a large literature detailing the impact on adults when *conflict* (*work family conflict, WFC*) between these two domains occurs, a problem experienced by one third of mothers and fathers (Strazdins et al., 2013). Cross sectional and emerging longitudinal evidence describes sustained and significant impairments in parents' mental health, with flow on effects to marital conflict and parent child interaction (Amstad et al., 2011). What is not known is whether this social determinant of adults' health, WFC, also poses risks for children. Does the 'long arm of the job' (Meissner, 1971) reach across generations to shape children's health and wellbeing? If so, how do these impacts occur? Is it though alterations in parent mental health, or because WFC alters family relationships and environments? Do these pathways depend on parent gender, and is there a dose response effect, whereby the longer parents experience WFC the greater the impact on children? This study addresses these questions and the evidence gaps they represent, using five waves of longitudinal data collected from Australian parents and children over a total of ten years (child ages 4 5 to 12 13 years). We conceptualize WFC as a dynamic process that can change or persist. The aim of this study is to investigate what happens to children's mental health when parents move into or out of WFC, and when WFC persists. We then seek to explain the mental health consequences for children via changes to three fundamental characteristics of children's relational environment: parents' mental health; parent child interactions; and the quality of the couple relationship.

Parents' employment is generally considered to be protective for child development, providing income, access to resources, self esteem, and social connectedness (Stansfeld and Candy, 2006). However, the dual demands of work and care pose a dilemma for contemporary parents, who combine care of children with income generation and job performance in competitive, often insecure, labor markets. *WFC* refers to the strains that arise for parents when these work and family demands are incompatible (Greenhaus and Beutell, 1985). WFC is based on the 'scarcity hypothesis', whereby the limited resources of time and energy become taxed to the point of overload (Goode, 1960). Strains occur from competing demands on parents' time (time based strains) and/or attention (attention based strains). These lead to fatigue, distress or emotional withdrawal as parents forgo family events or valued

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time with their children for work related opportunities and expectations (Crouter and Bumpus, 2001). Combined with their physical absence from family routines and activities, these maladaptive responses are likely to be one pathway by which work influences children (Strazdins et al., 2013).

1.1. Parents' WFC and child outcomes

Parenting behaviors and child development are governed by intersecting parent, child, social and environmental determinants. For children, safe physical environments, access to adequate nutrition, and relational environments — whether nurturing or neglectful — are fundamental. Disparities in these factors explain disparities in children's longer term developmental outcomes (Shonkoff, 2010). We argue that parents' workplace environments are largely unrecognized upstream social determinants of children's outcomes.

Parents' jobs, however enriching, stressful or depleting, are determinants of family resources including parents' time with children and parents' wellbeing (Cooksey et al., 1997; Dinh and Racionero, 2017; Dinh et al., 2017). Poor quality jobs that expose parents to work overload and intensity, low autonomy, long hours and inflexible schedules have been linked to more punitive and harsh parenting behaviors (Crouter and Bumpus, 2001; Perry Jenkins et al., 2007), reduced emotional availability (Johnson et al., 2013); poorer quality family relationship with children (Cooklin and Westrupp and et al., 2015; Cooksey et al., 1997) and less time together (Cooklin and Westrupp and et al., 2015; Johnson et al., 2013; Repetti, 1994; Strazdins et al., 2006). These associations are evident for both mothers and fathers, challenging the assumption that WFC is only a problem for mothers. Poor quality job conditions are also linked to poorer child and adolescent mental health in cross sectional studies (Dockery et al., 2016; Johnson et al., 2013), but there is a dearth of longitudinal evidence.

This study conceptualizes the work family interface as an important point of entry between labor markets, work conditions and the 'transfer of health' to children. Inter role pressures between work and family may be relatively small, but are daily and cumulative (Demerouti et al., 2004), resulting in psychological, emotional and cognitive impairments (Greenhaus and Beutell, 1985). To date, several cross sectional studies have linked parents' WFC to children's behavior problems (Strazdins et al., 2013; Vieira et al., 2016).

Few studies have investigated these associations across time. One exception is Chee et al. (2009) study of 340 employed mothers. Work related adversities (long hours, irregular scheduling) were associated with WFC and poorer maternal mental health at baseline. Unexpectedly, maternal distress was associated with a decrease in adolescent distress and problem behaviors one year later. Further research is warranted to ascertain the effect of parents' WFC on children over time.

1.2. Transitions in WFC as a determinant of child outcomes

WFC is dynamic, yet very few studies model it this way. Employees change jobs and alter workloads or roles within jobs resulting in changes in WFC (Cooklin et al., 2016; Kinnunen et al., 2004). Studying parents' movements into and out of WFC (transitions) and persistence in WFC advances theory and evidence by testing the extent to which child outcomes change in response to both *increases* and *decreases* in WFC.

Strazdins et al. (2006) pose three key pathways via which WFC affects children's relational environments — through parent wellbeing, parent child interactions, and inter parental relationships. Parents with optimal mental health have capacity to provide warm, nurturing and stimulating environments for their children, while parental stress and mental health difficulties are associated with poorer quality parent child interactions, less warmth, more irritability and less consistency (Conger et al., 2002). Children who experience parental anger or hostility, frequent rejection or low warmth are less able to self regulate, and are more likely to have conduct and aggression problems and emotional symptoms such as withdrawal and anxiety (Giallo et al., 2014). Similarly, children raised in environments with high marital conflict show more fearfulness, withdrawal and emotional insecurity into adolescence (Brock and Kochanska, 2016).

What evidence is there that WFC acts as an upstream 'stressor' on children's relational environments? Entry into, or persistence in WFC is associated with poorer parent mental health for both mothers and fathers (Cooklin et al., 2016). Cross sectional research has linked WFC with parenting stress (W. Goodman et al., 2011). The few studies that have looked specifically at parent child interactions report an association between WFC and increased irritability and less emotional stability, for mothers and fathers (Baxter and Smart, 2011; Kinnunen and Mauno, 1998; Lau, 2010), which in turn have been cross sectionally linked to variations in children's internalizing and externalizing behaviors (Vieira et al., 2016). WFC also appears to erode the couple relationship, marital satisfaction, and the quality of emotional exchanges between parents in both cross sectional and longitudinal research (Fellows et al., 2016).

In summary, there is theoretical and empirical support for the hypothesis that WFC can erode the family relational resources important to children's mental health. Few studies test this connection directly, robustly or dynamically. Does moving into WFC have immediate consequences to parents' relationship, parenting and mental health? What happens when WFC is relieved, for example? While it is assumed that mothers' WFC may be the most important, comparisons with fathers' WFC have yet to be undertaken. In Australia, the predominant pattern is for mothers to work part time, fitting their work around family responsibilities (Charlesworth et al., 2011). Conversely, Australian fathers face more frequent exposure to WFC because of long work hours (e.g. over 45 h/week), and a reluctance to access some of the job conditions that would ameliorate WFC (e.g. flexible scheduling, paid family related leave). Thus paternal WFC may be widespread and its impact long lasting (Cooklin and Giallo and et al., 2015). Analyses are therefore stratified by gender to ascertain differences or similarities in influences. Finally, there may be a compounding effect on children if both parents experience WFC simultaneously. Research indicates that fathers' and mothers' WFC 'crosses over' to affect each other's well being, compounding strains, poor mental health and conflict in the couple relationship (Demerouti et al., 2005; Fellows et al., 2016). If both parents 'enter' into WFC and if these conflicts persist, it is plausible that the risks to children's mental health are amplified.

1.3. The current study

We investigate the importance of mothers' and fathers' WFC transitions for their children's mental health, focusing on children in dual earner families — the most prevalent family form in Australia. We ask if there are differences in the pathway and effect size for mothers relative to fathers, if any effects are amplified when they combine in couples, and how such influences on children occur. Specific hypotheses and analyses are:

H1). Children whose mothers *or* fathers move into WFC (conscript), or experience persistent WFC will show worse mental health compared with children whose parents do not. Children whose mothers or fathers move out of (escape) WFC will show a corresponding improvement in mental health, although their mental health may be poorer relative to children whose parents do not ever report WFC.

H2). Children whose mothers *and* fathers move into, or experience persistent WFC will show worse mental health compared with children whose parents have different WFC, have escaped from WFC, or do not ever report WFC.

H3). The relationship between parents' WFC transitions and child

mental health will be mediated by corresponding changes (deficits or improvements) to parent mental health, couple relationship quality and parent child interactions.

2. Method

2.1. Design

The current study used five waves of data from the Kindergarten cohort of *Growing up in Australia*, the Longitudinal Study of Australian Children (LSAC). LSAC is an omnibus study of children's health and development, assessing a wide range of child, parent and environ mental variables using validated, brief measures. Data were collected biennially from a nationally representative sample via parent face to face interviews and questionnaires. The Kindergarten cohort data col lection commenced in 2004 (Gray and Sanson, 2005; Zubrick et al., 2014) when children were aged 4 5 years (Wave 1), and has continued to age 12 13 years (Wave 5). Of the contactable children selected and residing in the sampled postcodes, 4983 took part in LSAC (59% re sponse rate) (Soloff et al., 2005), with a high retention rate of 74% of the original sample (n = 3682) participating in all five waves (Norton and Monahan, 2015).

2.2. Participants

We limited the sample to dual earner couples (i.e., parents in a couple relationship, both employed) aged 24 65 years where both parents were employed in ≥2 consecutive waves. The total sample included data on 2496 couples and their children.

2.3. Measures

2.3.1. Children's mental health problems

Children's mental health was measured at each wave via Parent 1 (described as 'the parent who knows the child best', mostly mothers) report on the Strengths and Difficulties Questionnaire (SDQ). The SDQ is suitable for children aged 4 17 years. It contains four problem sub scales with five items each assessing emotional symptoms, conduct problems, hyperactivity/inattention, and peer relationship problems (5 items each; R. Goodman, 1997). Items are rated on a 3 point scale (not true; somewhat true; certainly true) and summed across the subscales to give a total problems score, with higher scores indicating more problem behaviors. The SDQ has high internal reliability (α = 0.81) (R. Goodman, 1997), adequate test retest reliability (range from 0.61 to 0.77), and comparable psychometric properties to the Rutter ques tionnaires and Child Behavior Checklist (R. Goodman, 1997). SDQ scores were standardized at each wave to represent relative ranking within age cohort to control for age variations.

2.3.2. Work family conflict transitions

Work and family conflict (WFC) was assessed using four items adapted from Marshall and Barnett's (1993) measure of strains between work and family. Two items assessed employment related strains on family life and parenting (e.g., 'Because of my work responsibilities, my family time is less enjoyable and more pressured') and two assessed strains from family responsibilities that affect work (e.g., 'Because of my family responsibilities, the time I spend working is less enjoyable and more pressured'). Responses ranged from 1 (strongly disagree) to 5 (strongly agree) and were averaged to obtain a total score of WFC as the four items load reliably onto a single construct (Westrupp et al., 2015). A cut off of > 3 (representing parents who agreed on some or most items) was applied to classify 'high' WFC (versus 'low/no' WFC) scores to construct the transition variables outlined below.

A transition in WFC (i.e., 'TWFC') was defined based on a parent's WFC categorization at the follow up wave compared to the index wave (i.e. from one wave to the adjacent next wave). For mothers and fathers separately, TWFC was coded as *never, conscription, escape* or *persisting*. Parents who had low WFC in the initial wave were classified as (i) *never* if parent WFC remained low at the subsequent wave; or (ii) *conscription* if the parent moved from low to high WFC in the subsequent wave. Similarly, if parent WFC was high in the initial index wave, TWFC was classified as (iii) *persisting* if it remained high in the subsequent wave; or (iv) *escape* if reported as low in the subsequent wave. The reference category in all analyses was *never*.

Couple transitions in WFC were derived by combining mothers' and fathers' measures. Families where both parents reported they had never experienced WFC ('*both never*') were the reference category against which families were compared where: (i) mothers and fathers were *both conscripted* into high WFC; (ii) mothers and fathers had *different* cate gories for WFC transitions (e.g., one was conscripted while the other escaped); (iii) mothers and fathers *both escaped* from high WFC; and (iv) mothers and fathers both had *persisting* WFC.

2.3.3. Family environment

Mothers' and fathers' self reported *mental health* was assessed using the Kessler 6 item (K6) measure of psychological distress (six non specific symptoms of distress and anxiety) (Kessler et al., 2002). Parents reported how often they felt each symptom (e.g., sad, nervous, worth less) from none (0) to all of the time (4). Responses were summed to give a continuous measure of distress (range 0 24) for each wave.

Marital dissatisfaction was assessed using mothers' and fathers' re sponse to the item: "Which best describes the degree of happiness, all things considered, in your relationship?" Responses were on a 7 point scale from 1 (extremely unhappy) to 7 (perfectly happy) and dichot omized (< 5) to reflect overall marital dissatisfaction (yes/no). Parent to child interaction was assessed by mothers' and fathers' self report of *parenting irritability* using 5 items (10 point scale), assessing frequency of hostile, harsh or rejecting behaviors toward the child (Zubrick et al., 2014). Items were averaged with higher scores indicating more fre quent irritable interactions.

2.3.4. Covariates

Analyses accounted for *parents' characteristics* including age (24 34; 35 44; 45 65 years), education (university versus no university quali fication), health problems (5 item checklist, e.g., chronic pain, diffi culty breathing; recoded to above or below the mean number of health problems), number of weekly work hours categorized for mothers (< 20 h; 20 40 h; > 40 h) and fathers (< 20 h; 20 40 h; > 40 50 h; > 50 h), and prior parent mental health (the K6 score from the index wave). Analyses also accounted for: *child char acteristics* including child gender, child age, child health status (ex cellent/very good), child special health needs and prior child mental health (the SDQ total score from the index wave; *family characteristics* including quintiles of equalized household income (total household income from all sources), calculated by applying the OCED modified equivalent scale (1 to the household head, 0.5 to each additional adult and 0.3 to each child), the number of children in the household, having an infant in family (0 = no infant, 1 = an infant), and; *neighborhood* socioeconomic disadvantage (mean = 1000; the higher the index, the less disadvantaged the location).

2.4. Data preparation

In every wave, approximately 10% of respondents did not provide answers for 5% or more of selected variables. Compared to those with complete data, those with missing data were more likely to report WFC, more distressed, more likely to be socioeconomically disadvantaged (lower education, fewer work hours, lower occupational status, poorer job quality) and to have a higher care burden (infant, more children, child with special health care needs). Missing data were imputed using a chained regression procedure, a suitable approach for imputing

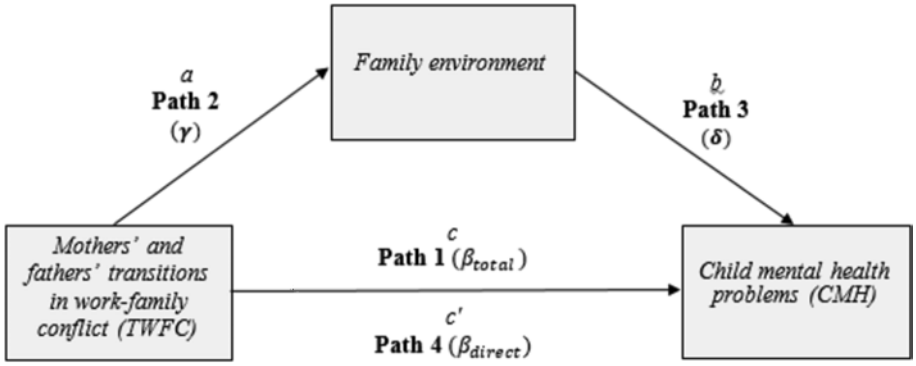

Fig. 1. Conceptual model linking parent transitions in work-family conflict to child mental health problems. Note: *a* (indirect effect), *b* (indirect effect), *c* (total effect) and *c'*(direct effect) represent hypothesized pathways.

incomplete large, national datasets (Royston and White, 2011). All model variables were included in the imputation analyses using one imputed dataset.

2.5. Statistical methods

A structural equation model with random effect treatment (Skrondal and Rabe Hesketh, 2004) was used to investigate the research hypotheses. Two level maximum likelihood regressions were used: the first level assumed fixed effects for covariates (e.g., demographics) while the second assumed random effects within individuals in the same household. This approach allows inclusion of both within and between individual effects and addresses limitations present in fixed effect models, which only examine within individual effects (Wooldridge, 2003, 2005). It also overcomes problems of imprecise estimates with large standard errors if predictors (e.g., parent education) vary between individuals but not over time (Plümper and Troeger, 2007). Our structural equation modeling simultaneously tested all paths of the hypothesized model (Fig. 1).

Path 1. The first step tested the total effects of parent TWFC (β'_{total}) on child mental health at the follow up wave ($CMH_{i,t}$) using linear regression, as described below in the equation for Path 1 (H1) (note analyses were stratified by mothers' and fathers' TWFC status; reference never vs. *conscript, escape* and *persistent*). Next, transitions for mothers and fathers were combined to test if children's mental health at follow up varied by combined couple TWFC (*never* reference vs. *conscript for both*, *different TWFC for each parent*, *escape for both*, and *persistent for both*) (H2).

$$\boldsymbol{CMH_{i,t}} = \propto_0 \propto_{1,i} + \propto_{2,t}\boldsymbol{t} + \propto_3 \boldsymbol{CMH_{i,t-1}} + \boldsymbol{\beta'_{total}}\boldsymbol{TWFC_{i,t}} + \boldsymbol{\theta' X_{i,t}} + \boldsymbol{u_{i,t}} \quad \text{(Path 1)}$$

Path 2. The second step tested the effect of mothers' and fathers' TWFC and couple TWFC on three aspects of the family environment reported by mothers and fathers. Models were tested using linear regression for parents' mental health ($PMH_{i,t}$) and irritable parenting ($Parenting_{i,t}$) and logit regressions for marital dissatisfaction ($Rela_{i,t}$).

$$\boldsymbol{PMH_{i,t}} = \gamma_0 + \gamma_{1,i} + \gamma_{2,t}\boldsymbol{t} + \gamma_3 \boldsymbol{PMH_{i,t-1}} + \boldsymbol{\gamma'_4 TWFC_{i,t}} + \boldsymbol{\gamma'_5 X_{i,t}} + \boldsymbol{u_{i,t,1}} \quad \text{(Path 2a)}$$

$$\boldsymbol{Pr}(\boldsymbol{Rela_{i,t}} = 1|\boldsymbol{t}, \boldsymbol{Z_{i,t}}) = \frac{\boldsymbol{exp}(\delta_0 + \delta_{1,i} + \delta_{2,t}\boldsymbol{t} + \delta_3 \boldsymbol{PMH_{i,t-1}} + \boldsymbol{\delta'_4 TWFC_{i,t}} + \boldsymbol{\delta'_5 X_{i,t}} + \boldsymbol{u_{i,t,2}})}{1 + \boldsymbol{exp}(\delta_0 + \delta_{1,i} + \delta_{2,t}\boldsymbol{t} + \delta_3 \boldsymbol{PMH_{i,t-1}} + \boldsymbol{\delta'_4 TWFC_{i,t}} + \boldsymbol{\delta'_5 X_{i,t}} + \boldsymbol{u_{i,t,2}})} \quad \text{(Path 2b)}$$

$$\boldsymbol{Parenting_{i,t}} = \varphi_0 + \varphi_{1,i} + \varphi_{2,t}\boldsymbol{t} + \varphi_3 \boldsymbol{PMH_{i,t-1}} + \boldsymbol{\varphi'_4 TWFC_{i,t}} + \boldsymbol{\varphi'_5 X_{i,t}} + \boldsymbol{u_{i,t,3}} \quad \text{(Path 2c)}$$

Path 3. The third step tested the effect of the three family environment variables measured at the follow up wave, i.e., parent mental health ($PMH_{i,t}$), marital dissatisfaction ($Rela_{i,t}$) and irritable parenting ($Parenting_{i,t}$), on child mental health ($CMH_{i,t}$) (H3) using linear regression as described in the equation for Path 3.

$$\boldsymbol{CMH_{i,t}} = \propto_0 + \propto_{1,i} + \propto_{2,t}\boldsymbol{t} + \propto_3 \boldsymbol{CMH_{i,t-1}} + \theta_1 \boldsymbol{PMH_{i,t}} + \theta_2 \boldsymbol{Rela_{i,t}} + \theta_3 \boldsymbol{Parenting_{i,t}} + \boldsymbol{\theta' X_{i,t}} + \boldsymbol{u_{i,t}} \quad \text{(Path 3)}$$

Path 4. The fourth step tested the total effects of parent transitions in WFC (β'_{total}) and the family environment (i.e., parent mental health($PMH_{i,t}$), marital dissatisfaction ($Rela_{i,t}$) and irritable parenting ($Parenting_{i,t}$)), on child mental health ($CMH_{i,t}$) using linear regression. Both the direct effects of TWFC (β_{direct}) on child's mental health and the mediation (indirect) effects of TWFC via the family environment ($1 - \frac{\beta'_{direct}}{\beta'_{total}}$) were estimated. Following Bauer et al. (2006) and L. A. Goodman (1960), the indirect effects of TWFC on child mental health were calculated as the products of the effects of TWFC on each aspect of family environment estimated in Path 2 and the effect of each aspect family environment on child mental health estimated in Path 3, taking into account correlation between them. The total effect is the sum of the indirect effects and the direct effects. Following Hayes (2009), bootstrapping with 500 replications was conducted to derive the standard errors.

$$\boldsymbol{CMH_{i,t}} = \propto_0 + \propto_{1,i} + \propto_{2,t}\boldsymbol{t} + \propto_3 \boldsymbol{CMH_{i,t-1}} + \boldsymbol{\beta'_{direct}}\boldsymbol{TWFC_{i,t}} + \theta_1 \boldsymbol{PMH_{i,t}} + \theta_2 \boldsymbol{Rela_{i,t}} + \theta_3 \boldsymbol{Parenting_{i,t}} + \boldsymbol{\theta' X_{i,t}} + \boldsymbol{u_{i,t}} \quad \text{(Path 4)}$$

Prior child mental health ($CMH_{i,t-1}$) was controlled to account for reciprocal effects between child's mental health and parents' WFC (Paths 1, 3 and 4). Prior parent's mental health ($PMH_{i,t-1}$) was adjusted as per equations for Paths 2a 2c. Analyses controlled for relevant parent, child, family and neighborhood covariates($X_{i,t}$). Note that in all models, random effects regression allowed us to adjust for relevant time specific effects (t) as proxies for child age effects, and for individual child time invariant effects ($\propto_{1i}$).

3. Results

Sample characteristics are described in Table 1 (N = 7652 observations; 2496 parent couples). There were 6080 transitions in WFC (TWFC) reported by mothers and fathers. Rates of transition were similar for mothers and fathers: 57 59% never experienced WFC; while between 12 and 15% were conscripted into conflict, escaped from conflict or experienced persistent conflict across two years. Mothers were more likely to be younger; and employed part time; and less likely to report marital satisfaction compared to fathers. There were no gender differences in parent mental health or irritable parenting. For children, the majority were in good health, with lower rates of mental health problems compared to the population (negative z score).

In 55% of couple transitions mothers and fathers experienced different TWFC; in 37% neither reported TWFC; in 2% both were conscripted into WFC; in 3% both escaped from WFC; and in 3.5% of transitions both parents experienced persistent WFC. More than half of the families were in the highest or second highest quintile of

Table 1
Sample characteristics for mothers and fathers (N = 2496 families).

	Mother	Father	Difference	p
Parent characteristics				
TWFC: Number of observations	6080	6080		
TWFC categories (%)				
Never	59.3	57.3	0.021	0.024
Conscript	12.4	13.4	0.009	
Escape	13.8	15.3	0.015	
Persistent	14.5	14.1	0.004	
Age group (%)				
24–34 years	6.8	3.7	0.031	0.000
35–44 years	65.2	53.7	0.114	
45–54 years	27.5	38.6	0.110	
55 years or above	0.5	4.0	0.035	
University qualification (%)	90.6	90.2	0.003	0.518
Health problem (%)	5.2	5.5	0.003	0.396
Number of weekly work hours (%)				
< 20	30.6	1.5	0.291	0.000
20-40	57.6	43.8	0.138	
40-50	8.3	31.1	0.228	
> 50	3.6	23.7	0.201	
Parent mental health (m, SD)	2.62 (2.9)	2.60 (2.9)	0.020	0.702
Marital satisfaction (%)	46	53	0.064	0.000
Irritable parenting score (m, SD)	2.11 (0.6)	2.12 (0.6)	0.009	0.409
Family-level characteristics				
Combined parents' TWFC (%)				
Both never	37.1			
Both conscript	2.1			
Both escape	2.3			
Both persistent	3.5			
Different TWFC	55.1			
Child male (%)	50			
Child global health excellent/very good (%)	91			
Child with special health care needs	13			
Child mental health problems (mean z scores)	0.11			
Equivalized household income (%)				
1st quintile (Lowest)	7.1			
2nd quintile	16.1			
3rd quintile	22.7			
4th quintile	26.2			
5th quintile (Highest)	28.0			
No. of children in household, m (SD)	2.5 (0.8)			
Neighborhood disadvantage, m (SD)	1009 (78)			

Notes: Data summarizes sample characteristics over five waves (N = 7652 observations). TWFC = parent transitions in work-family conflict.

equivalized household income; and were slightly above the Australian population mean (range 200 1200) on neighborhood socioeconomic advantage (Pink, 2006).

3.1. Work family conflict transitions and child mental health problems (Path 1)

Table 2 presents the stratified models of parent WFC transitions on child mental health (adjusted for prior child mental health) (H1). For mothers, any transitions involving high WFC were associated with higher rates of child mental health problems compared to children whose mothers never experienced WFC. The strongest effect was for *persistent* WFC (i.e., associated with one tenth of a standard deviation higher child mental health problems), followed by mothers being *conscripted* into WFC, then mothers *escaping* from WFC. For fathers, the strongest effect on child mental health was when fathers were *conscripted* into WFC, followed by *persistent* WFC. There were no detectable differences in child mental health comparing fathers who had *escaped* from WFC to those who had never experienced WFC.

For couples, there was no difference in child mental health outcomes between both parents reporting having *never* experienced WFC compared to both parents reporting *escape* from WFC. However, all other couple TWFC combinations were associated with higher rates of child mental health problems. The strongest effects were observed when both parents were *conscripted* into WFC or when both reported *persistent* WFC. Smaller effects were evident when parents reported *different* WFC transitions.

Table 2
Mother and father transitions in work-family conflict (TWFC) predicting child mental health problems (Path 1).

	Coef.	Bootstrap SE
Mothers' TWFC (reference 'Never')		
Conscript	0.09***	(0.029)
Escape	0.04**	(0.025)
Persistent	0.10***	(0.030)
Fathers' TWFC (reference 'Never')		
Conscript	0.10***	(0.031)
Escape	0.03	(0.024)
Persistent	0.07**	(0.030)
Combined couple TWFC (reference 'Both never')		
Both with escape WFC	0.03	(0.072)
Different TWFC	0.05***	(0.019)
Both with conscript WFC	0.15**	(0.079)
Both persistent WFC	0.13**	(0.061)

Notes: Tables show coefficients (Coef.) and bootstrap standard errors (SE) with 500 replications from structural equation models. Models adjusted for child (prior mental health, gender, health, special health care needs), parent (age group; university education, health problems, work hours) and household characteristics (equivalized household income, number of children, neighborhood disadvantage). In the pooled sample, characteristics of both parents' were controlled for.

3.2. Work family conflict transitions and family environment (Path 2)

Table 3 presents adjusted effects of parents' TWFC status on the three measures of the family environment. Mothers being *conscripted* into or experiencing *persistent* WFC reported higher levels of mental health problems and irritable parenting, and poorer marital satisfaction, compared to mothers who reported *never* having experienced high WFC. The effect of *escaping* from WFC on mothers' mental health and marital satisfaction was considerably smaller compared to the other types of WFC transitions, and there was no evidence of a difference between *escaping* and *never* having experienced WFC in terms of mothers' report of irritable parenting. For fathers, similar patterns and effect sizes were found. Compared to fathers who reported *never* having experienced high WFC, the strongest effects were evident on all relational outcomes for fathers *conscripted* into or experiencing *persistent* WFC, while any impact for fathers *escaping* were only evident on report of marital dissatisfaction, not for mental health or irritable parenting.

For couple analyses (Table 3), neither mothers nor fathers reported a higher risk to the family environment when both had *escaped* from WFC. However, where couples had *different* TWFC, or where both were *conscripted* into or experienced persistent WFC, both mothers and fathers consistently reported poorer relational environments on all indicators. The strength of effects of couple TWFC status on the three family environment measures differed slightly depending on whether outcomes were reported by mothers or fathers.

3.3. Family relational environment and child mental health problems (Path 3)

Table 4 presents results from three models testing the adjusted effects of the three family environment measures as reported by mothers (Model 1), fathers (Model 2), and both parents (Model 3), predicting child mental health problems. From Models 1 and 2, the strongest predictor of child mental health problems was mothers' and fathers' irritable parenting, followed by poorer mental health (reported by mothers), but not parent's marital dissatisfaction. When predictors were

Table 3
Mother and father transitions in work-family conflict (TWFC) predicting family relational environment (Path 2).

	Family environment					
	Parent mental health		Irritable parenting		Marital dissatisfaction	
	Coef.	Bootstrap SE	Coef.	Bootstrap SE	Coef.	Bootstrap SE
Mothers' TWFC (reference 'Never')[a]						
Conscript	0.90***	(0.106)	0.10***	(0.022)	0.28***	(0.090)
Escape	0.25**	(0.098)	0.02	(0.020)	0.22***	(0.083)
Persistent	0.79***	(0.107)	0.11***	(0.027)	0.65***	(0.094)
Fathers' TWFC (reference 'Never')[b]						
Conscript	0.99***	(0.114)	0.08***	(0.022)	0.66***	(0.084)
Escape	0.00	(0.097)	0.03	(0.019)	0.30***	(0.080)
Persistent	0.94***	(0.108)	0.14***	(0.025)	0.81***	(0.086)
Combined couple TWFC (reference 'Both never')						
Family environment reported by mother						
Both with escape WFC	0.13	(0.212)	0.03	(0.044)	0.33*	(0.193)
Different TWFC	0.41***	(0.064)	0.02**	(0.007)	0.32***	(0.058)
Both with conscript WFC	1.25***	(0.242)	0.06*	(0.033)	0.83***	(0.197)
Both persistent WFC	0.88***	(0.183)	0.09*	(0.045)	0.95***	(0.182)
Family environment reported by father						
Both with escape WFC	0.00	(0.201)	0.01	(0.042)	0.36*	(0.191)
Different TWFC	0.41***	(0.065)	0.04**	(0.016)	0.44***	(0.061)
Both with conscript WFC	0.97***	(0.252)	0.10*	(0.056)	0.68***	(0.198)
Both persistent WFC	1.15***	(0.212)	0.12***	(0.042)	0.93***	(0.166)

Notes: Tables show coefficients (Coef.) and bootstrap standard errors (SE) with 500 replications from structural equation models. Models adjusted for child (prior mental health, gender, health, special health care needs), parent (age group; university education, health problems, work hours) and household characteristics (equivalized household income, number of children, neighborhood disadvantage). In the pooled sample, characteristics of both parents' were controlled for.
*p < 0.1; **p < 0.05; ***p < 0.01.
[a] Family environment outcomes reported by mother.
[b] Family environment outcomes reported by father.

combined in Model 3, the effect size of mothers' irritable parenting was twice as strong as the effect size of fathers' irritable parenting. In the combined model, marital dissatisfaction did not predict child outcomes, although maternal mental health problems were associated with higher child mental health problem scores.

3.4. Work family conflict transitions, family environment and child mental health problems (Path 4)

Table 5 presents the adjusted direct and indirect effects of mother and father TWFC on child mental health problems. There was support for mediation in mothers' TWFC model. The total effects associated with mothers being *conscripted* into or experiencing *persistent* TWFC were largely indirect (55 58%), via mothers' mental health, parenting irrit ability and lack of marital satisfaction. Mediation was also evident for mothers reporting *escape* from WFC, where 32% of the total effects were indirect. Findings were similar for fathers. For fathers reporting *persistent* WFC, 57% of the total effect of TWFC on child mental health problems were indirect. For fathers *conscripted* into or *escaping* from WFC, 27 37% of the total effects were explained by the family en vironment differences.

For couple TWFC, 57% of the total effect of both parents experi encing *persistent* WFC on child mental health problems was explained by differences in the family environment. Similarly, when both parents were *conscripted* into WFC or reported *different* transitions in WFC, 43 47% of the total effects were explained by the family environment. There was also evidence for mediation with the weakest WFC predictor where both parents reported *escaping* WFC, 28% of the variance in child mental health was accounted for by indirect effects.

4. Discussion

Workplaces are one of the most important social institutions fa milies engage with, supplying critical resources to families. For many

Table 4
Three aspects of the family environment reported by mothers, fathers, or both parents predicting child mental health problems (Path 3).

	Model 1: Mother-report of family environment		Model 2: Father-report of family environment		Model 3: Mother and father-report of family environment	
	Coef.	Bootstrap SE	Coef.	Bootstrap SE	Coef.	Bootstrap SE
Family environment reported by mother						
Parent mental health	0.02***	(0.004)			0.02***	(0.004)
Irritable parenting	0.25***	(0.079)			0.26**	(0.101)
Marital dis-satisfaction	0.02	(0.018)			0.01	(0.020)
Family environment reported by father						
Parent mental health			0.00	(0.004)	0.00	(0.003)
Irritable parenting			0.17**	(0.078)	0.11*	(0.062)
Marital dis-satisfaction			0.02	(0.019)	0.01	(0.022)

Notes: Tables show coefficients (Coef.) and bootstrap standard errors (SE) with 500 replications from structural equation models. Models adjusted for child (prior mental health, gender, health, special health care needs), parent (age group; university education, health problems, work hours) and household characteristics (equivalized household income, number of children, neighborhood disadvantage). In the pooled sample, characteristics of both parents' were controlled for.
*p < 0.1; **p < 0.05; ***p < 0.01.

Table 5
Mother and father transitions in work-family conflict (TWFC) predicting child mental health problems directly and indirectly via the family environment (Path 4).

	Total Effects			Direct Effects			Indirect effects		
	Coef.	Bootstrap SE	%	Coef.	Bootstrap SE	%	Coef.	Bootstrap SE	%
Mothers' TWFC ('never WFC' as the reference)									
Conscript	0.09***	(0.029)	100	0.04	(0.030)	42	0.05**	(0.011)	58
Escape	0.04*	(0.025)	100	0.03	(0.024)	68	0.01***	(0.006)	32
Persistent	0.10***	(0.030)	100	0.05*	(0.028)	45	0.06**	(0.017)	55
Intercept variance	0.12***	(0.029)							
Intra coefficient of correlation	0.24***	(0.047)							
Fathers' TWFC ('never WFC 'as the reference)									
Conscript	0.10***	(0.031)	100	0.07**	(0.029)	73	0.03*	(0.016)	27
Escape	0.03	(0.024)	100	0.02	(0.023)	63	0.01*	(0.005)	37
Persistent	0.07**	(0.030)	100	0.03	(0.030)	53	0.04*	(0.022)	57
Intercept variance	0.29***	(0.039)							
Intra coefficient of correlation	0.41***	(0.042)							
Combined couple TWFC (reference 'Both never')									
Both with escape WFC	0.03	(0.072)	100	0.02	(0.067)	72	0.01	(0.017)	28
Different TWFC	0.05***	(0.019)	100	0.03*	(0.019)	57	0.02*	(0.010)	43
Both with conscript WFC	0.15*	(0.079)	100	0.08	(0.072)	53	0.07**	(0.035)	47
Both persistent WFC	0.13**	(0.061)	100	0.05	(0.058)	43	0.07*	(0.041)	57
Intercept variance	0.27***	(0.043)							
Intra coefficient of correlation	0.41***	(0.055)							

Notes: Tables show coefficients (Coef.) and bootstrap standard errors (SE) with 500 replications from structural equation models. Models adjusted for child (prior mental health, gender, health, special health care needs), parent (age group; university education, health problems, work hours) and household characteristics (equivalized household income, number of children, neighborhood disadvantage). In the pooled sample, characteristics of both parents' were controlled for.
*p < 0.1; **p < 0.05; ***p < 0.01.

families, however, they also generate WFC. This research is one of the first to document *if* and *how* the work family interface poses a risk to children. We show that when employment and family are in conflict with each other, this undermines both parents' and children's health. Using a novel longitudinal approach, we trace the pathways of influ ence on children as a consequence of transitions in parents' experiences of WFC. Our analyses showed that when parents move into WFC and when it becomes chronic, children's wellbeing is adversely affected both directly and indirectly via increases in poor parent mental health, parenting irritability and marital dissatisfaction. Using a representative sample of Australian parents, we found there were linkages between both mothers' and fathers' WFC and child wellbeing.

In our adjusted analyses, the onset and persistence of WFC pre empted greater mental health problems in children, compared to chil dren of parents with little or no WFC. For mothers, *persistent WFC* was associated with the poorest child mental health, followed by *conscrip tion* into WFC. For fathers, this pattern was reversed; *conscription into WFC* was associated with the poorest child mental health, followed by *persistent* WFC. Notably, when fathers' escaped from WFC, their child's mental health was similar to children whose fathers had never experi enced WFC. For mothers, any experience of WFC had a detrimental effect on child mental health that was detectable over a two year period, even when mothers' WFC was relieved.

These results indicate that both fathers' and mothers' WFC has im plications for children's mental health, however mothers' WFC delivers the more sustained adverse effects. Persistent gender norms around work and care and how these shape parents' capacity to navigate the work family predicament may explain this. Mothers are more likely to tailor their work around children's needs, utilize flexible or part time work options, respond to 'critical incidents' of conflict (e.g. a sick child), and spend more time in routine and daily care of their children (Maume, 2006; Radcliffe and Cassell, 2015). Fathers are more tied to a 'breadwinner' model and less able to adjust their working hours (Burnett et al., 2010). Qualitative evidence suggests that mothers' un paid work and care has a buffering effect on fathers' WFC, but amplifies mothers' own conflicts (Radcliffe and Cassell, 2015). These differences likely intensify the adverse effects of mothers' WFC on children's mental health.

Our second hypothesis was supported. Children were at substantially higher risk of poorer mental health when couples reported some combination that involved at least one parent experiencing WFC at one or more waves (i.e. the *different* WFC combination category compared to none), and at even higher risk again if both parents' re ported *conscript* or *persistent WFC*. This suggests a dose response effect, whereby children are at greater risk when their exposure to WFC in creases and is sustained. This is a novel contribution, building on the recent research that has shown this pattern at a single point in time, for parents of 4 5 year old children (Strazdins et al., 2013). Our findings show that couples' WFC is independently and substantively detrimental to children's mental health beyond the early years of age.

Overall, the hypothesized mediation pathways that WFC influences children's mental health via the family environment were supported. WFC conferred measurable adverse effects on parents' own functioning and relationships. Compared to parents who reported little or no WFC, mothers and fathers who entered into, or reported persistent WFC, were more likely to report more mental health problems, poorer marital sa tisfaction, and more irritable parenting.

Conflicts at the work family interface can undermine parents' ca pacity to effectively manage multiple and competing demands, eroding their well being. Prior longitudinal research has supported a 'loss spiral' effect whereby this negative relationship between strain and mental health is compounded over time (Demerouti et al., 2004; Westrupp et al., 2015). Closely related to this are the adverse effects on quality of the couple relationship and on the nature and tone of parent child in teractions. WFC encompasses behavioral, attention and time based strains (Greenhaus and Beutell, 1985), and has been associated with emotional withdrawal, conflict or inequitable sharing of domestic work and childcare (Allen et al., 2000). Plausibly, WFC strains parents' tol erance and interpersonal skills, heightening irritability, tension, and fatigue or prompting withdrawal, such that both partner to partner and parenting interactions are affected. Consistent with this, we report a positive relation between higher WFC and more frustrated, impatient, irritable parenting interactions.

Through these three critical indicators of children's relational en vironments our findings show *how* the work family interface can in fluence children's socio emotional wellbeing. The 'worst' scenario for children was when both parents were either *conscripted into* WFC or experienced *persistent* WFC, adversely affecting parent mental health,

parent to parent and parent child interactions.

4.1. Strengths and limitations

Notable strengths of this study included the use of five waves of data which enabled us to study change in WFC as opposed to the most common past approaches which have treated WFC as a largely static condition. Unique to this field of inquiry, couple level effects were investigated. Data were from employed couples participating in a national cohort study broadly representative of Australian parents and children. Our structural equation modeling enabled precise specification of direct and indirect effects of WFC transitions to child mental health, revealing how these were mediated through family environments. This approach also allowed us to account for correlations between mediators and random effects by individuals within households, and the analyses were adjusted for children's pre existing mental health, to ensure that any effects reported between WFC transitions and child mental health were *de novo*. Parents' prior mental health was similarly accounted for in all models. Key factors known to influence children's outcomes (e.g., parent health, family socioeconomic status, parent education) were also adjusted for to minimize the risk of confounding. Together, these features strengthen the likelihood of a causal interpretation. Multiple imputation was used to overcome some of the biases introduced by selective attrition in the longitudinal sample. Bootstrapping was conducted to produce more robust standard errors of estimates. The sample was sufficiently powered to examine multiple potential mediating mechanisms.

There are however, several limitations. While LSAC is broadly representative, socioeconomically disadvantaged families are under represented and our focus on couples resulted in single parents being excluded. The associations between WFC and relational environments needs to be explored in these and other families where children have elevated risks for mental health problems. We use all parent report measures including for the main child mental health outcome, likely incurring reporting bias. For example, mothers experiencing persistent work family conflict may have fewer emotional resources (e.g. patience, consistency) to manage challenging child behaviors and therefore perceive and report their child as more 'difficult'. We note, however, that the linkages between *fathers*' WFC transitions and children's mental health (mother report) were similar to the effect for mothers. This provides some reassurance that our main effects are not due to reporting bias. WFC transitions were measured as change across two time points, two years apart. Smaller, more episodic, or more sustained WFC were not captured, but may be equally important.

5. Conclusions

The intersection between work and family life the work family interface describes how two of the most important domains in adults' lives interact with each other. This study is one of the first to investigate whether conflict at this interface is a core process via which the 'long arm of the job' (Meissner, 1971) influences children's development. The modeling of fathers', mothers' and couples' experiences of conflict between work and family demands shows a clear, and consistent relationship with children's wellbeing. Furthermore, the modeling reveals how such change may be happening. Movement into WFC and sustained WFC are linked to poorer mental health for children. We find this is due to the erosion of parents' mental health, parent to parent and parent child interactions. This effect is compounded when *both* parents' experience new or sustained WFC.

Parents' work family conflict has been neglected as a potential determinant of children's health and subsequently as a target for prevention and health promotion. In developed countries where dual earner families are the norm and one in three mothers and fathers report WFC (Strazdins et al., 2013), a large number of children are vulnerable to the adverse health effects of this contemporary social dilemma. Earlier research has identified the characteristics of jobs that are broadly supportive of optimal work family balance, and reduced WFC for parents of young children. These include jobs that have manageable hours, autonomy and control over workloads, flexibility and control over scheduling, along with job security and family specific support from immediate supervisors (Michel et al., 2011). Ensuring jobs are really family friendly, for fathers as well as mothers, will not only be an intervention that supports the health of any parents who combine employment with raising children, it will be a public health intervention that could protect and promote the mental health and wellbeing of children.

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ORIGINAL RESEARCH

What Contributes to Gendered Work Time Inequality? An Australian Case Study

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Abstract
Women's employment equality remains compromised by wage and work hour gaps, despite decades of policy action. Shorter work hours are a key to persisting disadvantage because they lock women out of high paying, good quality jobs. Such hour gaps are observed across all countries, and this paper quantifies the reasons behind them. We applied the Oaxaca decomposition method to a sample of employed adults from the Household Income and Labour Dynamics in Australia (HILDA). The method can show how the work hour gap would change if (a) women had the same sort of jobs (industry, occupation, work conditions, contract type) as men have and (b) if men lowered their work hours and/or increased their domestic unpaid work. We find that men's allocation of time in and out of the home and the jobs women typically work in are central to explaining unequal paid hours. Women's hours would increase (all else being equal) if they worked in the same industries and had the same job security as men have, accounting for 74% of the explained work hour difference. Women's hours would also increase if they did the same (lower) domestic work as men, or if men worked the same (shorter) hours women typically do (33.4% of the explained gap). Our study, using Australian data, underscores the need to prioritize men's time use (shorter paid hours, longer unpaid hours) alongside improvement in jobs and work conditions to progress gender equality in employment.

Keywords Work time · Unpaid time · Gender inequality · Australian labour market

1 Introduction

Women's labour market participation has increased over the past few decades—a change viewed as an essential for gender equality. From 1990 to 2016, the participation rate of women aged 15–64 increased by 5.7% across the OECD, and by more than 10% in Australia (OECD 2017). This means the participation rate gap between men and women has reduced from 24.2% in 1990 to 17% in 2016 in OECD, and 23.4% to 11.3% in Australia (OECD 2019). However, it is not just whether women hold jobs or earn income that is

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important to achieving equality, it is the type of job, the benefits it delivers and the equality of opportunity and income that matters. Wage gaps persist and in some countries are increasing (OECD 2019a), and across most developed countries, women work significantly fewer hours on the job than men do. According to the OECD (2019) this equates to 100 min more paid work for men than women every day, and this time gap widens the wage gap. Thus, in most countries, the rise in women's participation is concentrated in part-time or shorter hour jobs which often yield less earnings, security, conditions and benefits. Women may have increased their employment, but they work in jobs with less pay and poorer conditions compared to men (RBA 2018).

We argue that time inequality is a key driver of gendered income and employment inequality, due to the way paid and unpaid time is shared between men and women. Unpaid or non-market work such as childcare and other domestic work limits time free for market work, and when good jobs require longer hours, the constraints posed by unpaid workloads become acute. On the labour demand side, some jobs offer a certain number of hours per week, and skill matching combines with time availability so that workers self-select into these jobs in gendered ways. Even if they offer poorer pay or prospects, they also offer feasible hours, making them the best choice when time outside the labour market is constrained. There is therefore a mutual influence, the demand side whereby characteristics of jobs and sectoral employment structure determine workhours, interlinked with individual characteristics, including time availability. Both combine to create a process that embeds gender inequality through time. Below we provide detailed discussion of these.

First, we discuss the labour supply side and why women, despite having equal education and skills, work shorter hours than men. Across almost all countries, developed and developing, women perform more unpaid domestic work and care giving than men do (Dinh et al. 2017; Craig 2007a), though the gap has recently narrowed a little. The narrowing gap, however, is not because men are doing much more but because women are doing less (Baxter 2002). This suggests that work that was previously done by women in the unpaid sector has either moved into the paid sector or is simply being left undone (Bianchi et al. 2000). However, women continue to work significantly more hours than men on unpaid work, particularly care time, even when they hold down jobs (OECD 2014; Craig and Bittman 2005; Baxter 2002). Women in fact work equal or more total weekly hours than men do if both paid and unpaid hours are considered. For example, Craig (2007a) used the Australian time-use diary data and found that women had similar total hours per week, and even higher weekly hours than men if simultaneous activities were counted.

Further, women not only commit more hours to unpaid tasks than men, but the unpaid work that they do is more fragmented, responsive to others' needs, and difficult to defer, all of which limits availability for paid work (Smith et al. 2014; Craig 2007a, b). Men's childcare, maintenance and gardening tasks are generally more flexible or irregular and can be moved to accommodate job demands. Life-course patterns supports this key role played by gendered sharing of time. Gender gaps in paid workhours widen when unpaid workhours peak and are most apparent in families with young children, then women typically increase workhours as children grow older (Abroms and Goldscheider 2002; Craig and Bittman, 2005). Even when children grow up, these time gaps add up, casting a long shadow into older age. Motherhood (but not fatherhood) reduces lifetime employment and earnings which underpin retirement, thus inequality in employment generates inequality in retirement and old age (Gray and Chapman 2001).

As Ferree (2010) argues, gender is not just a role or an individual attribute but an inequality shaped by multiple institutions. The flow and distribution of time within households is especially central to this inequality-generating process, because time is exchanged

to earn income. Thus type of time use determines capacity to earn income because time and money are so closely dependent. Unequal relative resources or bargaining power, and cultural/traditional gender ideology serve to reinforce uneven time use within the home, which drives uneven earnings outside of it (Greenstein 2000; Williams et al. 2013). Economic theories highlight the material pathway thatthat connects households to labour markets through time, and these combine with ideology to reinforce unequal outcomes for men and women. Thus men's wage advantage makes it economically optimal for the lower earning partner to use her time to do the work that is unpaid, thereby freeing her partner to work and earn more (Becker 1981; Nicodemo and Waldmann 2009). This translates into greater household income—an economically rational choice—*and* into women working in short hour jobs, with their accompanying lower pay, conditions and status. The opportunity cost of women's labour market participation is another factor affecting how gendered time use creates inequality in and outside the home. High childcare cost discourages women's employment participation and workhours, further undermining any economic advantage for women to work more (Givord and Marbot 2015).

There are also demand side factors which reinforce time's key role in gender inequality. Many businesses choose to offer part-time jobs to minimize operation costs, and these are especially common in sectors where women dominate. The Reserve Bank of Australia (RBA) report (RBA 2018) showed that part time work has become more common in education, healthcare and social services, administration and support industry, retail trade, arts and recreation, and hospitality. In contrast, industries with longer workhours and with higher pay are usually male-dominated, especially high skilled occupations with good salaries, or blue collar jobs which offer overtime (Cha and Weeden 2014; Wilkins and Wooden 2014; Blau and Kahn 2017; Minnotte et al. 2010; Reskin 1993). Women's shorter hours jobs tend to be poorer quality, offering them less autonomy, less flexibility and higher insecurity (Charlesworth et al. 2011). Women also tend to work in casual jobs which offer more time flexibility, but return lower pay and income instability (Blau and Kahn 2017; Autor et al. 2008). Thus the sex segregation of industries flows along workhours as well as along skill and pay lines, so that 'good jobs' becomes men's jobs, delivering the highest pay and prestige, and also requiring the longest hours (Williams et al. 2013).

Summary. This paper decomposes the workhour gap between men and women, our aim is to identify what contributes to it. The core idea is to explain the gap in paid workhours by a set of predictors that vary systematically by gender. The decompositions reveal how much of the workhour gap can be explained by gender differences in individual, household and job characteristics, including unpaid or domestic time. The approach we use offers several benefits. It can assess (or decompose) the extent gender difference in workhours is due to difference in (a) amount or level of a predictor (such as education) or (b) the way a predictor affects workhours (e.g. educational attainment does not contribute to women's hours in the way men's educations does). The method therefore estimates two terms. The first shows the expected change in women's workhours if women and men were equal in the level of predictors. The second shows the expected change in women's workhours if predictor influences were equal between men and women. Our decomposition analysis does not show causality, but will show the extent variance in the workhour gap is explained, and by what.

The predictors we focus on are *unpaid domestic and care time* and *partner's paid workhours*, which reflect the gender exchange of time within households (Cha and Weeden 2014). Labour market variables central to workhours include industry and occupation (reflecting structural drivers of workhours) as well as job characteristics such as contract type (casual jobs are generally part-time and unpredictable). Work pace or intensity and

work flexibility are key elements of job quality that may enable or constrain workhours. Thus more flexibility in jobs, generally enjoyed by men (Gerstel and Clawson 2014) enables longer working hours (Lott and Chung 2016). High intensity or work place likely reflects workloads and longer hours, but via its impact on mental health, may reduce them (Mortimer et al. 1996). We also control for a range socio-economic characteristics and health variables including years after schooling, health status, ethnicity, education, and year, state and urbanity. Some of these (e.g. education) are likely to capture gender differences in opportunity or reflect gender inequality in health such as the gender excess in depression rates (Albert 2015), while other are likely to structure the types of jobs and industries available.

1.1 Research Questions

How might gendered workhour gaps change if:

(a) women had the same jobs (occupation, work conditions, contract type, industry) men have and;
(b) if men lowered their paid workhours and/or increased their domestic unpaid work?

2 Data and Empirical Method

2.1 Data

We used 13 waves (waves 5–17) of the HILDA. HILDA is a nationally representative household-based panel study that began in 2001. Each wave has more than 7000 households with more than 17,000 household members. The survey asked respondents about their employment, time use, family circumstances, health and socio-economic characteristics through face-to-face interviews and self-completed questionnaires.

We limited the sample to waves 2005–2017 as some of the variables in our models were not collected before 2005. We further limited our sample to employed workers aged 25–70 years who had data on workhours and other covariates. We excluded young adults and students aged 24 and under because the HILDA Survey did not collect data on study time. Further, our models included partner's market workhours as a key driver of workhour differences in households. This therefore excludes observations without a partner. The final sample was 57,962 observations (28,213 male and 29,749 female observations) over a 13-year period. An unbalanced panel spanning 13 years with 17,713 unique people was established.

2.2 Estimation Method—the Oaxaca Decomposition

The decompositions in this paper are based on regression analysis of the relationships between the paid work time and its correlated predictors. Such analyses reveal the associations that characterize the work time inequality rather than causality. The Blinder–Oaxaca decomposition method (Oaxaca 1973) explains the difference in the mean of a dependent variable (paid workhours) between men and women by decomposing the difference into two key parts. The first part is due to *differences in the mean values* of the predictors (*Xs*) of the outcome (*Y*), or impact of between-group differences in the predictors (*Xs*). The

second part is differences in the outcome *not* explained by the differences in mean values of observed predictors (*Xs*), instead it captures the group differences in the *effects* of the observed predictors (*Xs*) on the outcome. For example, women may have lower education than men (the explained part), and the effect of education on paid work time for women is also different from that for men (the unexplained part).

Assumingly Y is explained by a vector of predictors (*Xs*), according to a regression model:

$$Y_m = \beta_m X_{i,m} + \varepsilon_m \quad \text{if men} \tag{1}$$

$$Y_W = \beta_w X_{i,w} + \varepsilon_W \text{ if women} \tag{2}$$

where Y is weekly paid workhours, β is a vector of coefficients including intercept, and ε is the error terms. X is a vector of predictor variables. Since the Ordinary Least Squares (OLS) estimates of the error terms ε will be zero mean, the gap between the mean outcomes of men and women is then equal to:

$$\bar{Y}_m - \bar{Y}_w = \bar{\beta}_m \bar{X}_m - \bar{\beta}_w \bar{X}_w = \bar{\beta}_m (\bar{X}_m - \bar{X}_w) + \bar{X}_w (\bar{\beta}_m - \bar{\beta}_w) = \bar{\beta}_m \Delta X + \bar{X}_w \Delta\beta \tag{3}$$

Equation (3) is a special case of a general decomposition (4) where the interaction term is often small or negligible as below:

$$\bar{Y}_m - \bar{Y}_w = \bar{\beta}_m \Delta X + \bar{X}_w \Delta\beta + \Delta X.\Delta\beta \tag{4}$$

The gap in mean outcomes between men and women can be thought of as deriving from a gap in *endowments* (*E*) (the first term of Eq. 4), a gap in *coefficients* (*C*) (the second term of Eq. 4), and a gap arising from the interaction between endowments and coefficients (*CE*) (the last term).

The *first term* is the gendered differences in the predictor variables (*X*s) weighted by the men's coefficients, indicating workhour differences between the sexes that can be explained by differences in the predictor levels. In other words, the endowment measures the expected changes in women's average paid workhours if women had men's predictor levels. The *second term* is the unexplained differential (differences between men's and women's coefficients) weighted by the women's (mean) predictor variable levels. It measures the expected change in women's average paid workhours if women had men's coefficients. This term can also capture gender discrimination in the labour market as well as other, non-observed influences. For example, when both men and women own the same sets of endowments but the outcome is still different, it is often believed that the difference is due to gender discrimination. However, it is not always the case because the second component also captures all potential effects of differences in unobserved variables as well as the different effects (between sexes) of predictors on the outcomes. In our case, for instance, variables such as women's lifestyle, motivation, employment opportunities and so on which are unobserved in the data or not fully captured in unpaid time use may result in shorter paid work, assuming women have a similar set of endowments as men do. The other example is cost of childcare, as this also affects market time gap and women's labour supply differentially (Arulampalam et al. 2007). However, these variables are not available in our data.

We extended the linear regression decomposition (4) to take into account sample selection bias because we considered a sample of employed people. Blau and Kahn (2017) argue that selection bias is even a more serious issue for women's wage employment, because the

further the wage sample is away from 100% of the population, the larger is the selection bias. The selection bias can be addressed by using the Heckman selection model (Heckman 1979) where household non-wage income and financial distress are used to predict labour market participation in the selection equation. The argument is that these factors are likely to affect the labor market participation, but not directly affect the paid work time i.e. how many hours employers offer people to work. The selection correction term—known as the inverse Mills ratio from the selection equation estimation is then used to adjust the group mean difference in the outcome variable. We also tried using *health status* and *unpaid time* as instrument variables in the selectivity process, but these variables are invalid instruments as they are also associated with paid work time. A further extension in our paper is to apply the instrument variable (IV) method. Partner's paid work time is likely correlated with individual's paid work time, that is, partner's paid work time is potentially endogenous. We use the *unpaid time, having child*(*ren*) *under six-year-old, total household non-wage income, financial distress* as instrument variables to predict partner's paid workhours.

2.3 Dependent Variable, Predictor and Covariate Measures

Measure description. Our outcome of interest, the dependent variable, is weekly workhours *(WklyWorkhours).* It measures respondent's reported weekly paid workhours in all jobs. Predictors and covariates in our model include individual characteristics (such as having children under 6 years old, unpaid time, partner's paid workhours education, years after schooling or work experience, ethnicity, health status variables), job-related characteristics (work intensity, work flexibility, employment type, industry and occupation) and location and time (urbanity, 8 states and year).

All measure statistics are provided in Table 1. Domestic and care time (*unpaid time*) was the sum of respondent's estimates of the number of hours they usually spent each week caring for own and other's children (unpaid basis), caring for disable/elderly relatives, doing domestic errands, outdoor tasks and housework, cooking and laundry. *Partner's workhour* is partner's total weekly paid workhours. *Education level* has 7 groups, from Postgraduate to Year 11 or below. *Years after schooling* was computed as age *minus* schooling years *minus* 6. *Ethnicity* has 9 groups including Non-indigenous Australian, Indigenous/Torres Strait Islander, New Zealanders, Europeans, Middle East and North Africans, East and Southeast Asians, South and Central Asians, Americans, and Central & Southern Africans. *Mental health* was constructed from five questions: 'Have you been a very nervous person?', 'Have you felt so down in the dumps that nothing could cheer you up?', 'Have you felt downhearted and blue?', 'Have you felt calm and peaceful?' and 'Have you been a happy person?'. Item responses ranged from 1, 'none of the time', to 6, 'all of the time', which was transformed using Ware et al. (2000) approach, to a 0–100 scale, the higher is the score the better is mental health. *Physical functioning* was constructed from ten questions[1] (Vigorous activities; Moderate activities; Lifting or carrying groceries; Climbing several flights of stairs; Climbing one flight of stairs; Bending kneeling or stooping; Walking more than one kilometer; Walking half a kilometer; Walking 100 m; Bathing or dressing yourself) to a 0–100 scale using the same approach as mental health

[1] Each item response took three values: 1 'limited a lot', 2 'limited a little' to 3 'not limited at all'.

Table 1 Selected variable statistics (working couple sample, aged 25–70, 2005–2017)

Variable Description	Female		Male		T-test for diff
	Mean	Std Dev.	Mean	Std Dev.	(*p*-value)
Weekly workhours	31.9	13.7	43.6	12.4	0.0000
Unpaid weekly workhours	30.6	23.5	19.2	16.2	0.0000
Total paid and unpaid hours	60.0	18.7	61.0	16.0	0.0000
Partner's workhours	39.7	17.2	23.5	18.2	0.0000
Mental health score	75.6	15.3	77.4	14.8	0.0000
General health	72.5	18.5	71.2	17.8	0.0000
Physical functioning	88.2	17.4	89.5	17.6	0.0000
Work experience (years)	24.8	11.4	25.8	11.5	0.0000
Have children under 6 (yes = 1)	0.21	0.41	0.28	0.45	0.0000
Urban (Urban = 1)	0.86	0.35	0.87	0.34	0.0902
Education (%)					
[1] Postgrad—masters or doctorate	7.0	25.5	8.2	27.4	0.5037
[2] Grad diploma, grad certificate	9.5	29.3	6.6	24.9	0.0000
[3] Bachelor or honours	22.1	41.5	17.5	38.0	0.0000
[4] Advanced diploma, diploma	11.8	32.3	10.3	30.4	0.0000
[5] Cert III or IV	16.6	37.2	31.3	46.4	0.0000
[6] Year 12	12.6	33.2	10.7	30.9	0.0000
[7] Year 11 and below	20.5	40.4	15.4	36.1	0.0000
Tertiary education (%)	38.5	48.7	32.3	46.7	0.0000
Work intensity	67.8	19.8	67.9	18.4	0.2962
Work intensity	57.8	25.8	62.6	23.5	0.0000
Type of employment contract (%)					
[1] Fixed term contract	10.4	30.5	9.3	29.0	0.0000
[2] Casual employment	18.2	38.6	10.3	30.4	0.0000
[3] Permanent or ongoing contract	71.4	45.2	80.4	39.7	0.0000
Occupation (%)					
[1] Managers	12.0	32.5	20.5	40.3	0.0000
[2] Professionals	30.8	46.2	23.7	42.5	0.0000
[3] Technicians, Trades Workers	4.1	19.9	19.9	39.9	0.0000
[4] Community and Personal Service	14.0	34.7	5.4	22.6	0.0000
[5] Clerical and Administrative Workers	24.3	42.9	7.5	26.4	0.0000
[6] Sales Workers	7.2	25.9	3.9	19.5	0.0000
[7] Machinery Operators and Drivers	1.1	10.3	11.1	31.4	0.0000
[8] Labourers	6.5	24.6	8.0	27.2	0.0000
Industry (%)					
[1] Agriculture, Forestry and Fishing	2.1	14.5	3.5	18.4	0.0000
[2] Mining	0.5	7.2	3.2	17.5	0.0000
[3] Manufacturing	5.0	21.7	12.9	33.5	0.0000
[4] Electricity, Gas, Water and Waste	0.4	6.0	1.7	12.8	0.0000
[5] Construction	2.2	14.8	13.1	33.7	0.0000
[6] Wholesale Trade	2.4	15.2	4.8	21.4	0.0000
[7] Retail Trade	8.8	28.4	5.6	23.0	0.0000
[8] Accommodation and Food Services	4.4	20.5	2.6	15.9	0.0000

Table 1 (continued)

Variable Description	Female		Male		T-test for diff
	Mean	Std Dev.	Mean	Std Dev.	(*p*-value)
[9] Transport, Postal and Warehousing	2.4	15.2	7.8	26.8	0.0000
[10] Information Media and Telecom	1.9	13.8	2.5	15.5	0.0005
[11] Financial and Insurance Services	4.6	21.0	4.0	19.6	0.0002
[12] Rental, Hiring & Real Estate Services	1.6	12.7	1.4	11.8	0.0000
[13] Professional, Scientific and Techn	8.2	27.4	9.3	29.0	0.0000
[14] Administrative and Support Service	3.4	18.2	2.5	15.7	0.0000
[15] Public Administration and Safety	5.5	22.8	8.3	27.6	0.0000
[16] Education and Training	17.3	37.8	5.8	23.3	0.0000
[17] Health Care and Social Assistance	24.6	43.1	5.6	23.0	0.0000
[18] Arts and Recreation Services	1.2	10.9	1.5	12.0	0.0214
[19] Other Services	3.4	18.1	4.1	19.8	0.0000

Estimates were adjusted for sample weights

construction. *General health* was constructed from five questions[2] (Self-assessed health; Get sick a little easier than other people; As healthy as anybody I know; Expect my health to get worse; My health is excellent) to a 0–100 scale using the same method as for mental health and physical functioning. These higher health measure scores suggest better health conditions. *Work flexibility* (0–100) was constructed from three questions 'I have a lot of freedom to decide when I do my work', 'my working times can be flexible', and 'I can decide when to take a break'. *Work intensity* (0–100) was constructed from three items e.g., 'I have to work fast in my job', 'I have to work very intensely in my job' and 'I don't have enough time to do everything in my job'. High scores on both measures indicate more flexibility (intensity). *Employment type* had three categories (fixed-term, casual, on-going permanent). *Occupation* (8 groups, see Table 1). *Industry* has 19 groups of one-digit industries using the ANZSIC 2006 classification.

Measure Validity. Wooden (2009) showed that the HILDA health measures were strongly correlated with the similar measures in ABS and NHS data. Further, Butterworth and Crosier (2004) demonstrated the validity of the SF-36 health data in the HILDA Survey and supported its use in population health research. For time use, time use diaries are the most accurate method of time data collection (Craig 2007a, b; Robinson and Godbey 1997). The diaries are comprehensive and detailed as they ask respondents to record their activities in time blocks (usually in 5, 10 or 15 min intervals), identifying their primary activities (e.g. paid work, cooking, cleaning) and secondary (helping children do homework) activities. Time diaries, however, are relatively expensive and can be burdensome to respondents (Schulz and Grunow 2012). Further, time dairies cover a short period of 24 or 48 h (that is one or two days of the week), thus comparing time use data longitudinally is problematic. Our measures of time use (paid and unpaid) involves a survey measure that asks people to estimate the hours per week they typically spend on sets of related activities (for example, paid work, housework, errand, caring etc.) and uses a short set of question

[2] The first item response ranged from 1, excellent, to 5, poor health, and the last four item responses ranged from 1, definitely true, to 5, definitely false.

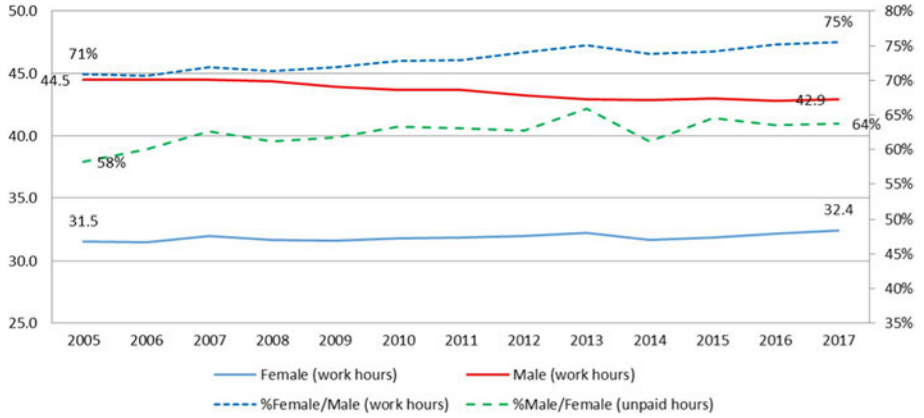

Fig. 1 Weekly work hours by sex and year (working couple sample, aged 25–70, 2005–2017). (Color figure online)

items. While survey measures are potentially distorted by recall bias (reporting error), typically leading to overestimates of unstructured activities such as domestic work and care (Juster et al. 2003; Schulz and Grunow 2012), they supply fairly accurate estimates of hours spent in employment (Sonnenberg et al. 2012). They also preserve the rank ordering of time expenditures useful for longitudinal analyses (Juster et al. 2003). Strazdins et al. (2016) compared HILDA time use with nationally representative time diary estimates published by the ABS and showed that HILDA time use estimates similar to ABS time diary estimates with minor exceptions.

3 Empirical Results

3.1 Descriptive Statistics

Table 1 presents summary statistics for key variables. Among employed coupled men and women aged 25–70, men worked longer paid hours, enjoyed more work flexibility in their jobs, had more secure jobs, and predominated in high status occupations. Similarly, men predominated in industries such as Agriculture, forestry and fishing; Mining; Manufacturing; Electricity, gas and water supply; Construction; Whole sales; Transport; and Public administration and safety. Women worked relatively shorter hours (11.7 workhour gap), but spent 11.4 more hours each week doing unpaid work. Women were more likely to report poorer mental health and physical functioning relative to men.

Figure 1 shows that during the past 13 years, the work time gap between men and women has narrowed (blue dotted line). Men's weekly paid workhours declined by about 1.6 h (red line), while women's paid workhours increased by 0.9 h (blue line). The gap between the two groups reduced from 29 to 25%. Accompanied by the declining gap in paid work time is the increase in men's unpaid time relative to that of women. It increased from 58% in 2005 to 66% in 2013 before declining back to 64% in 2017 (green dotted line).

Figure 2 shows how the gap (between orange and green lines) changes over the life course between coupled men and women. In the younger age 25–29, women's paid

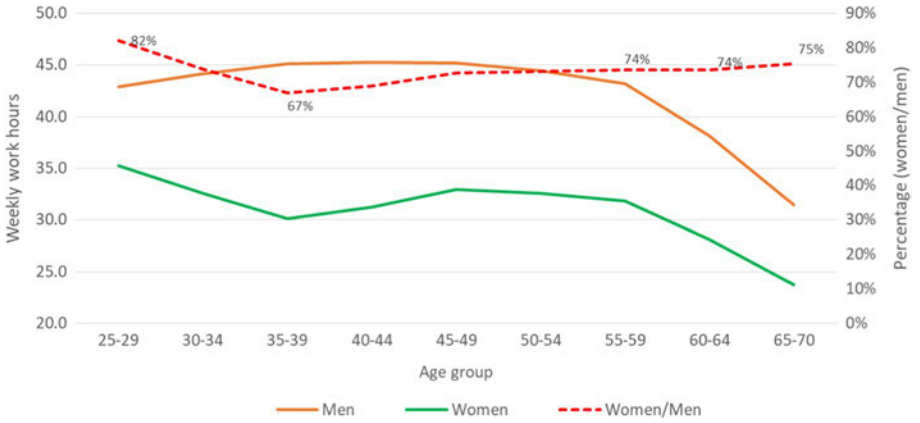

Fig. 2 Weekly paid work hours by agegroup and sex, couple sample (2005–2017). (Color figure online)

Table 2 Mean weekly paid workhours by age group and by sex (couple sample, aged 25–70)

Age	All	Men	Women	Women/Men (%)	Men-women diff (h)
25–29	39.0	42.9	35.3	82.2%	7.7
30–34	39.0	44.1	32.6	73.8%	11.5
35–39	38.2	45.1	30.2	66.9%	14.9
40–44	38.5	45.3	31.3	69.0%	14.0
45–49	39.5	45.3	33.0	72.8%	12.3
50–54	38.9	44.5	32.6	73.3%	11.9
55–59	38.2	43.2	31.9	73.7%	11.4
60–64	34.2	38.2	28.1	73.7%	10.0
65–70	28.9	31.4	23.7	75.5%	7.7
Total	38.2	43.6	31.9	73.2%	11.7

workhours are closest to men's, at 82.2%, women's work time then declines sharply between age 29 and 39, peak childbearing ages. In contrast, the workhours of same age men increase and reach the maximum of 45 h. Women's hours gradually rise thereafter; however, the maximum hours they work remain only 75.5% of men's. After aged 60, both men and women's paid work time declines sharply at the same pace while the ratio remains stable at around 74%. By the time they retire, women's workhours are still 24.5% lower than men's (see also Fig. 2). Within couples, women always spent more time on unpaid work than male partners did, at every stage of the life course (Appendix 1).

Table 2 presents the paid workhour gaps for our sample by age. The average hour gap was 11.7 h per week (favoring men). The largest gap is observed at age 35–39 (peak childbearing and rearing, 15 h per week), and the smallest is between young adults aged 25–29 (7.7 h per week). For men and women aged over 50, the gap is 10.3 h per week.

Table 3 Oaxaca decomposition of work time gap between men and women (couple sample, aged 25–70)

Detailed decomposition	OLS estimator				IV for partner's work time				Heckman selection			
	Endowment (1)	% (2)	Coefficient (3)	% (4)	Endowment (5)	% (6)	Coefficients (7)	% (8)	Endowment (9)	% (10)	Coefficient (11)	% (12)
Unpaid hours	1.7416	41.0	2.5532	32.7					1.7352	40.9	2.5492	32.0
Child under 6 (yes = 1)	−0.3088	−7.3	0.8922	11.4					−0.3087	−7.3	0.9062	11.4
Partner's work-hours	−0.0409	−1.0	0.478	6.1	1.2958	33.4	3.0278	49.5	−0.0414	−1.0	0.4463	5.6
Work intensity	−0.1778	−4.2	−1.0798	−13.8	−0.2103	−5.4	−1.0054	−16.4	−0.1781	−4.2	−1.0791	−13.6
Work flexibility	−0.1685	−4.0	0.8488	10.9	−0.1376	−3.5	0.4585	7.5	−0.1688	−4.0	0.8282	10.4
Employment type (3 groups)	0.8493	20.0	−0.0564	−0.7	0.7272	18.8	−0.1539	−2.5	0.8543	20.1	-0.037	−0.5
Industry (19 groups)	1.7423	41.1	0.117	1.5	1.6848	43.4	−0.114	−1.9	1.7353	40.9	0.0754	0.9
Occupation (8 groups)	0.5671	13.4%	−0.4706	−6.0	0.4437	11.4	−0.3033	−5.0	0.5711	13.5	−0.4188	−5.3
General health (lag)	−0.009	−0.2	1.5396	19.7	−0.0149	−0.4	1.1706	19.1	−0.0085	-0.2	1.5645	19.7
Physical functioning (lag)	−0.0049	−0.1	1.0272	13.2%	−0.0043	−0.1	0.4815	7.9	−0.0045	−0.1	1.0125	12.7
Mental health (lag)	0.0268	0.6	−1.6515	−21.1	-0.0035	−0.1	−0.0958	-1.6	0.0271	0.6	−1.6875	−21.2
Years after schooling	−0.0696	−1.6	4.6217	59.2	0.0249	0.6	4.1523	67.9	−0.0683	−1.6	4.6992	59.1
Ethnicity (9 groups)	−0.0105	−0.2	0.9307	11.9%	0.0024	0.1	0.5202	8.5	−0.0098	−0.2	0.9698	12.2
Education (7groups)	0.1026	2.4	0.1771	2.3	0.0769	2.0	0.1531	2.5	0.1036	2.4	0.1723	2.2
Urbanity (yes = 1)	−0.0041	−0.1	-0.311	−4.0	0.0007	0.0	−0.8029	−13.1	−0.0038	−0.1	−0.2982	−3.7
State (8 groups)	0.008	0.2	0.5208	6.7	−0.0014	0.0	0.47	7.7	0.0088	0.2	0.5215	6.6

Table 3 (continued)

Detailed decomposition	OLS estimator				IV for partner's work time				Heckman selection			
	Endowment (1)	% (2)	Coefficient (3)	% (4)	Endowment (5)	% (6)	Coefficients (7)	% (8)	Endowment (9)	% (10)	Coefficient (11)	% (12)
Year (13 years)	−0.0005	0.0	−0.0329	−0.4	−0.0062	−0.2	−0.1185	−1.9	-0.002	0.0	-0.025	−0.3
Constant			−2.2929	−29.4			−1.7208	−28.1			−2.2452	−28.2
Subtotal	4.243	100%	7.811	100%	3.878	100%	6.119	100%	4.242	100%	7.954	100%
Men's workhours	43.028***				42.503***				43.175***			
	(0.0889)				(0.0811)				(0.1531)			
Women's workhours	31.765***				32.911***				31.760***			
	(0.1064)				(0.0902)				(0.1064)			
Difference (men vs. women)	11.263***	100%			9.592***	100%			11.415***	100%		
	(0.1387)				(0.1213)				(0.1865)			
Endowments (explained)	4.243***	38%			3.878***	40%			4.242***	37%		
	(0.2233)				(0.1580)				(0.2230)			
Coefficients (unexplained)	7.811***	69%			6.119***	64%			7.954***	70%		
	(0.1901)				(0.1517)				(0.2316)			
Interaction term	−0.791***	−7%			−0.406**	−4%			−0.782***	−7%		
	(0.2604)				(0.1829)				(0.2607)			
Observations	43,105				57,963				42,639			

Robust standard errors in parentheses were adjusted for sampling weights, significant

In the top panel, we removed the significance stars and robust standard errors for succinct reason (as the table is too large). The coefficients of series dummy variables are aggregated from their sub-coefficients e.g. coefficient of "Industry" is the sum of 19 industry dummy coefficients. We do not report the interaction coefficients as they are relatively negligible

***$p<0.01$, ** $p<0.05$, * $p<0.1$

3.2 Work Time Gap Decomposition Results

Table 3 presents the decomposition results using the Oaxaca command in Stata (see Jann 2008). The first four columns (model 1) are for linear regression (OLS) decomposition. The next four columns are for instrumental variable (IV) decomposition in which we instrumented partner's work time using unpaid time, a dummy variable for having a child(ren) under 6 years old, household non-wage income, and financial distress. The last four columns are for the Heckman selection decomposition model in which we corrected for the sample selection bias.[3] The first stage of the selection estimation is to estimate probability of participating in the labour market and inverse Mills ratio (we used household non-wage income and financial distress as instruments for the selection process in the selection equation). In the second stage, the Mills ratio is added in the work time equation to correct for the selectivity bias. The standard errors in all estimates were adjusted for the sample weights. For ease of reading we removed standard errors and significance stars from the top panel of Table 3. We also do not report the interaction coefficients (between endowments and coefficients) as they were relatively small. The first stage of IV and Heckman decomposition models can be found in Appendix 2.

The second panel of Table 3 displays the overall decomposition results of men-women paid workhour difference. Overall, men averaged 42.5–43 h per week in paid work, while women averaged 32–33 h per week (a gender gap of 10–11 h per week). The observed difference is smallest (9.6 h) in the IV model and largest (11.4 h) in the Heckman selection model. Three models produce quite close results, however given the corrections delivered by the Heckman selection models we focus on those results.

3.2.1 Explained Component of the Gendered Workhour Gap

Not all the factors that might explain workhour differences between sexes were observed or available in our data. It is therefore expected that any models of workhours can only explain some parts of the variation across men and women. Consistently the three models in Table 3 only explain about 37–40% of the variation, an acceptable result consistent with Blau and Kahn (2017). The unexplained variance in our models is therefore 64–70% and variance explained by interactions is fairly small, 4–7%.

Of the estimated gender workhour gap of 11.4hours per week, about 4.2 h were explained by difference in endowments between sexes: in other words, women's workhours would increase by an average of 4.2 h every week if women had the same levels of predictors men did (*Xs*). For example, if women move into higher work time industries, their paid work time would increase by about 1.74 h per week, all else equals. However, 70% of the gap (or 7.9 h) is due to changing effects of predictor variables or the expected change in women's average paid work time if women had men's coefficients.

Among the explained part of the paid workhour gap (endowments in columns 1, 5, and 9, top panel of Table 3), *industry* and *unpaid time* are the biggest contributors to the gendered workhour gap, both accounting for nearly 41% of the explained variance. This reflects the sex stratification of industries with female dominated jobs offering lower hours

[3] Because work time is only available for employed people who are typically different from non-employed people, the estimates using employed people sample are thus biased (i.e. selection bias).

or part-time work whereas male dominated workhours are almost universally full time (e.g. Blau & Kahn, 2017; Autor et al. 2008).

Other job-related factors include *occupation* and *employment contract*. More female workers are often found in casual and fixed term contracts than men, and in community and personal services, clerical and administration, sales and hospitality jobs (see Table 1). Together, industry, occupation and employment contract type contribute to about 74% to the explained portion of the gender workhour gap in our models. Two other job characteristics which reflect quality of work also affect the gender workhour gap. Women would work fewer hours if they had men's lower work intensity and men's greater work flexibility (by about one third of an hour). Low wages are linked to job inflexibility (Watson and Swanberg 2010), but because women are more time constrained than men, they are more likely to accept the unfavorable (in terms of pay, workhours, intensity and flexibility) jobs.

Unpaid time and *partner's workhours* reflect the potential household drivers of unequal workhours. When we added partner's work time, a dummy variable for children under 6, and unpaid time together in the OLS and Heckman models, we observed the overwhelming role of unpaid time in explaining the gender workhour gap (41%). However, when we used a dummy variable for children under 6 and unpaid time to instrument partner's work time (IV model), we observed the previously obscured role played by (male) partner's long workhours, which contribute to 33.4% of the explained gap. This contribution is close to the net contribution of children under six, unpaid time and partner's work time (in OLS and Heckman models). If women had men's (lower) unpaid time, they would increase their work time by 33.4% (of the explained part). The larger unpaid work burden and childcare contribute considerably to widening the work time gap. Own unpaid time and partner's work time are the second largest predictors for the work time gap between sexes. This finding is in line with sociological literature (OECD 2014; Craig 2007a, b; Craig and Bittman 2005; Baxter 2002) which shows how the gender division of labour in households is a fundamental driver of employment inequality.

3.2.2 Unexplained Component of the Gendered Workhour Gap

The coefficients in Table 3 (columns 3, 7 and 11) represent the variance that is not explained by differences in mean levels of predictors (endowments) but due to gender differences the way these predictors affect workhours (i.e. coefficients). Overall, this 'unexplained' part of the difference accounts for up to 70% (or 7.95 h) of the paid work time gap, considerably more than the variance explained by difference in endowment levels. It can be interpreted as the expected change in women's workhours if they had men's coefficients including the model intercept. There are two sub-parts, one is due to the difference between the intercept of the equations for men and women (the *constant* in Table 3), and the other is the effect of substituting men's coefficients. The *constant* (contributed to 28–29% in the 'unexplained' part) is the difference in workhour starting points due to "group membership", that is, by virtue of belonging to two different groups (male and female). This is likely due to unobserved factors, omitted variables, and gender discrimination in the labour market.

The effect of changing coefficients reflects the contribution of differing 'returns' to the predictors on workhours (Blau and Kahn 2017). For example, in Table 3, years after schooling (or work experience) would increase women's workhours by 4.7 h if they had the same influence on their workhours as men's, pointing to very different returns on work experience for women in the labour market. If women had the same effect of work intensity

on hours as men do, their workhours would reduce by 1.08 h/week, and if they had men's work flexibility effect on hours, their workhours would increase by 0.83 h. These indicate that women's hours are less responsive (ie do not expand as much) as men's do when they face high pressure, workloads and demands, but more responsive than men's when hours are flexible (suggesting short hours are a strategy to achieve flexibility and women would work longer if they could control when they started and stopped). We also find significant contributions of health on the gender workhour gap. Thus, if women's health affected their workhours in the same way men's health affected workhours, they would change their paid workhours considerably—by increasing them in the case of good general health and physical health and reducing them in the case of poor mental health. Similarly, if women's unpaid hours had the same (weaker) impact on their paid workhours as men's, their paid workhours would increase by 2.55 h. Under the IV for partner's workhours (where unpaid work was used to instrument partner's workhours) the coefficient indicates that if women's workhours were as (similarly) unresponsive to how long their partners work as men's currently are, their weekly workhours would rise by over 3 h per week.

Overall, considering the "endowments" and "coefficients" in the decomposition, unpaid time, partner's long workhours, sex segregated industries, poor quality jobs and gender differences in health explain almost all of gender workhour gap.

4 Conclusion, Policy Implications and Limitations

4.1 Discussion, Conclusion and Implications

We considered how the workhour gap might change if women worked in the same jobs and industries, and had the same time to invest in employment, as men. Our study decomposed the 11.7 weekly workhour gap observed in our sample of Australian men and women, using the Blinder–Oaxaca decomposition method. The method explains the gender difference in workhours by estimating how differences in levels and influences of predictors contribute (or co-vary). We found that women would work just over 4 h a week longer if they had the same jobs (contract type, conditions, occupational status, and industries), and did the same (lower) amount of care and domestic work as men. We also found that women's workhours would increase by a further day a week more (7.9 h) if the influence of these predictors was comparable to the way they affect men's. For example, our decomposition indicates that men have more flexible jobs, which appears to enable longer workhours *and* have a weaker effect on how long they work. In other words, flexibility matters more to how long women can work *and* they have less flexibility in their jobs. Similarly, women spend more time on domestic work and care *and* household time demands place greater constraints on working for pay, compared with men. Our approach, applied for the first time (to our knowledge) to gender workhour gaps, helps quantify the relative importance of what may be driving them, supplying evidence to prioritize policy action.

Our results accord with existing evidence and theory on how gender divisions of time within the home intersect with gender discrimination in the labour market, to drive gender inequality in employment (Hill et al. 2004; Abroms and Goldscheider 2002; Craig and Bittman 2005; Craig 2007a). Thus gender ideology and discrimination, via money and time, connects unequal opportunity within the home (aligning men's greater earning power in the labour market with gendered choices on who should do what terms of care) and in the labour market (Ferree 2010; Becker 1981). On the labour demand side, our findings are

also consistent with the human capital/economic literature which shows that women tend to work or accept lower paid and insecure, inflexible job in industries such as health care, hospitalities, retail, food industries where low hours are normal and often offered (e.g. Blau and Kahn, 2017; Autor et al. 2008).

It is important to note that our analysis cannot demonstrate causal ordering. We cannot say, therefore, whether the sex segregation of industries (which runs along both pay and workhour lines) is because women's time is constrained or due to other factors such as values, discrimination and ideology. What we can say is that that the types of jobs women work in and their unpaid time are both critical ingredients of the gender workhour gap. We expect that they are, in reality, closely related and mutually reinforcing each other. In the meantime, worker characteristics such as work experience, education and health status were not very strong in explaining the 'explained part' of the gap, but were important contributors in the 'unexplained part' of the gap. Years after schooling or work experience, for example, delivers men a far greater workhour advantage than it does for women. Similarly, gender differences in health, especially mental health only made a small contribution to the gender difference in workhours. Yet poor health for women mattered much more to how long they worked compared with men (interestingly this only applied for physical health, in contrast women's mental health had a weaker effect on workhours that it did relative to men). It's important to note that there are many unexplained factors expressed partly through the constant and through the differential influences revealed by coefficients. These unexplained factors reflect processes that are extremely difficult to measure, for example gender discrimination on and off the job. In the Heckman model, they account for nearly one third of the hour variance under the unexplained part.

4.2 Study Limitations

The nationally representative and longitudinal data over 13 years offers flexibility in our modeling in this paper. The richness of the data enabled us to employ different estimation techniques to address endogeneity and the sample selection bias, as well as use lags to address reverse causality. However, as previously discussed, our analyses are able to estimate associations, not causal direction, revealing the relationships that co-vary with work time inequality. For example, the differences we found in endowments and coefficients such as unpaid time, industry, occupation, employment contract can explain most of the gender workhour gap. However, preferences for working in certain industries, occupations or types of employment contract are not completely exogenous. Some women may want to work short hours in sex segregated industries due to their lifestyle, the type of work, the work values or interests they hold, or other factors not captured in our data; they then self-select into certain occupations or industries or short-hour jobs (Gershuny 2011).

A second limitation is our self-reported measures, especially of time use. Generally, survey measures overestimate time use, especially unpaid time use, due to recall bias and the problem of 'double counting' whereby both primary and secondary time is included (e.g., looking after children while cooking dinner, see Strazdins et al. 2016). This is a problem for precision, introduces error and can inflate or add random variability into time use estimates. We therefore believe that the time estimates we use are valuable in terms of prediction and where the aim is to explain variance, but should not be viewed as accurate, population-based time use estimates. On the other hand, by yielding an ordered value for each individual on weekly unpaid hours (most time use diaries do not cover seven days) they offer an important advance to understanding the relationship between gender divisions

of time within the home to gender gaps in time outside of it. Embedded in a large, longitudinal data set which connects time use estimates to a wide range of other covariates and predictors (included lagged predictors) our measure (and our analysis) provides a new capability to understand how estimates of time inside and outside the home relate to gender inequality in employment.

Our models included partner's paid workhours because of their likely significance for the gender workhour gap (which our analysis verified). This is because of the exchange of time within households, which is gendered, usually maximises income. It is a potent 'catch 22' for women's employment equality. Fed by inequality (men earn more money in the labour market) the household exchange between partners creates a gendered time constraint for women which further hampers their employment equality in the labour market. When we considered average weekly work time for the excluded (non-couple) sample by gender, we observed that the work time gap still exists among single or non-coupled men and women, but it is smaller (about 6 h). The excluded, non-coupled sample, accounts for about a quarter of the whole sample. Our estimated workhour gap, therefore, is overestimated relative to the whole population of working age men and women. Importantly, non-coupled men worked 2.5 h less than men in the coupled sample, while non-coupled women worked about 3.5 h more than the women in the coupled sample. This difference (whereby men's workhours and earning capability increase when in a couple whereas women's workhours and earning capability reduce) underscores how central the unequal time exchange in households is to unequal employment outcomes, further boosting men's time in the labour market even as it limits women's.

4.3 Implications for Policy

Despite decades of policy action, gender inequality in employment outcomes persists in most countries. Wage gaps and workhour gaps are interconnected because long hour jobs attract wage premium, and enable greater earnings (Cha and Weeden 2014). Should equality in employment policies therefore be aiming for women to work the same (longer) hours men currently do? Our study, we hope, might provide some guidance. Generally, policy analysis of what hampers women focuses on structural (sex segregation in industry and occupation) and attitudinal (beliefs and gender ideology about what women and men should do, discrimination against women in leadership roles). Our study supplies evidence that quantifies the likely contribution of structural factors. More flexibility would help women work longer, as would greater job security and permanent contracts, while enabling women to work in male dominated industries, and men to work in female dominated industries may all help narrow the gender workhour gap. Our results would therefore support these remain important foci for employment equality reforms.

However, we find that women's unequal time in domestic work and care is the single most important determinant of the gender workhour gap in our model. Not only does women's time in the home reduce their time on the job it also enables men to lengthen their workhours. Thus when we substitute partners workhours for unpaid time in our models we find a similar, powerful, gendered contribution to the workhour gap. Gender equality policy needs to understand that hours on and off the job form a gender-time system that mutually shaped each other, and both will need to be addressed. Few gender equality policies tackle, head on, this interdependency between men's and women's domestic and care hours in households and capability to work longer hours in the market. This unbalanced interplay within the household likely strengthens the sex segregation of industries and further

reinforces time and earning gaps. Our study, using Australian data, underscores the need to prioritize men's time use (shorter paid hours, longer unpaid hours) alongside improvement in jobs and work conditions to progress gender equality in employment.

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Appendix 1

See Table 4.

Table 4 Weekly unpaid time change over the age groups (working couple sample)

Women	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–70
Care time (h)	6.3	14.2	17.8	13.2	7.8	4.9	4.6	5.0	5.5
Domestic time (h)	11.6	16.1	19.8	21.2	20.9	21.1	21.3	22.2	25.4
Unpaid time (h)	17.2	28.7	35.7	33.3	28.2	25.6	25.6	26.8	30.3
Total time (h)	51.8	59.6	63.1	62.0	59.6	57.7	56.9	54.8	53.0
% Care time (of unpaid time)	37	49	50	40	28	19	18	19%	18
Men									
Care time (h)	5.3	8.5	10.2	8.9	6.4	4.0	3.3	2.2	2.4
Domestic time (h)	9.9	11.3	12.6	13.0	13.9	14.2	13.9	13.6	14.2
Unpaid time (h)	15.0	19.7	22.6	21.8	20.2	18.2	16.9	15.7	16.5
Total time (h)	56.7	62.0	65.2	64.7	63.6	61.2	58.9	53.3	47.3
% Unpaid time (women/men)	141	169	176	161	146	146	157	177	193
% Total time (women/men)	96	100	100	97	95	94	97	103	113

Appendix 2

See Table 5

Table 5 First stage of IV and Heckman Oaxaca decomposition

	Partner's Workhours	Wage Job Selection
Variable	First stage (OLS model)	First stage (Probit model)
	For IV decomposition	For Heckman decomposition
Weekly unpaid workhours	0.1998***	
	(0.0050)	
Child under 6 years old	−9.7626***	
(yes = 1)	(0.2410)	
Equivalized household non-wage income	−0.0271***	−0.0033***
($'000)	(0.0020)	(0.0002)
Financial distress index (best 0–100 worst)	−0.0738***	−0.0090***
	(0.0088)	(0.0003)
Constant	26.0777***	1.0081***
	(0.5929)	(0.0418)
Observations	65,153	123,813
F-stats	126.9	
Prob > F	0.0000	
Wald chi2		1526.13
Prob > chi2		0.0000

Robust standard errors in parentheses

All models controlled for state and year dummies. Equivalised household non-wage income is the total household income from all sources excluding own salary/wages, adjusted using the OECD-modified equivalence scale, which assigns a value of 1 to the household head, 0.5 to each additional adult and 0.3 to each child). Financial distress was constructed from six items, e.g., 'Could not pay electricity, gas or telephone bills on time'

***$p < 0.01$, ** $p < 0.05$, *$p < 0.1$

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Hour-glass ceilings: Work-hour thresholds, gendered health inequities

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ABSTRACT

Long workhours erode health, which the setting of maximum weekly hours aims to avert. This 48 h limit, and the evidence base to support it, has evolved from a workforce that was largely male, whose time in the labour force was enabled by women's domestic work and care giving. The gender composition of the workforce has now changed, and many women (as well as some men) combine care giving with paid work, a change viewed as fundamental for gender equality. However, it raises questions on the suitability of the work time limit and the extent it is protective of health. We estimate workhour mental health thresholds, testing if they vary for men and women due to gendered workloads and constraints on and off the job. Using six waves of data from a nationally representative sample of Australian adults (24 65 years), surveyed in the Household Income Labour Dynamics of Australia Survey (N = 3828 men; 4062 women), our study uses a longitudinal, simultaneous equation approach to address endogeneity. Aver aging over the sample, we find an overall threshold of 39 h per week beyond which mental health declines. Separate curves then estimate thresholds for men and women, by high or low care and do mestic time constraints, using stratified and pooled samples. We find gendered workhour health limits (43.5 for men, 38 for women) which widen further once differences in resources on and off the job are considered. Only when time is 'unencumbered' and similar time constraints and contexts are assumed, do gender gaps narrow and thresholds approximate the 48 h limit. Our study reveals limits to contemporary workhour regulation which may be systematically disadvantaging women's health.
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1. Introduction

In 1930 the International Labour Organisation (ILO) set the maximum working week to 48 h. This remains the current hour limit beyond which, according to the ILO, no worker should exceed because of the potential health and safety risk (Lee et al., 2007; Spurgeon, 2003). These limits were set for a workforce that was once largely male, at a time when gender divisions were normative and paid work and caregiving separate endeavours. Now, in developed economies such as Australia, nearly two thirds of working age women are in the labour force (one third in 1961, one fifth in 1947 Strachan and Burgess, 2002; Wilkins and Wooden, 2014). Work time expectations are also changing. Economies are digital, business communicates globally, and paid work can and does happen outside a standard eight hour day. For large segments of the labour force this is extending the working week, even while the gender composition is changing.

It is therefore not known if the maximum hour limit protects women's health, or the health of any employee who combines employment with caregiving. Men work more hours than women do in most developed countries (10 h per week averaged over 18 OECD countries, Landivar, 2015), but are able to do so because of their unequal involvement in child care or domestic work (OECD, 2016). Such inequalities in non work time drive inequalities in the labor market, creating gender gaps in op portunities, income, participation and pay, what we term the hour glass ceiling (Cha, 2010; Cha and Weeden, 2014; Jacobs and Gerson, 2006). We investigate if they also generate gender gaps in mental health, a leading cause of disability and disease burden worldwide (Whiteford et al., 2013). We seek to identify work hour mental health thresholds taking into account men's and women's gendered resources on and off the job, especially their time.

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1.1. Changing times

For more than two centuries, workhours have generally been falling, yet recently this trend has reversed. Gershuny (2011) shows that since the 1980s workhours are rising in the UK, US, Canada and Australia, although the increase is not dramatic. The average, however, hides the way labour markets are polarising in terms of hours, with a significant group of people who are working long and another working short hours. For example, in 1980, 9% of Ameri cans worked longer than 50 h each week, by 2000 it was 14% (Cha and Weeden, 2014). Similar changes are observed in Australia where 13% of employees worked 50 h or more in 1978, 19% in 2000 (Australian Bureau of Statistics, 2010). Meanwhile rates of under employment and low hour jobs are increasing – in Australia from 15% in 1978 to 29% in 2004 (Australian Bureau of Statistics, 2005), in the US from 18% in 1976 to 20% in 2013 (Valletta and Bengali, 2013). It is likely that both long and short hours are linked to poorer health in workers, that is, there are thresholds whereby working at least some hours is health supportive, but only up to a point (Kleiner and Pavalko, 2010). This possibility would explain why research on social inclusion and participation shows that some time spent in work generally improves mental health (Dooley and Prause, 2009).

However, few studies have identified what the turning point might be. Prospective studies and systematic reviews have shown there are detrimental impacts of long hours on mental health as well as a wide range of other health disorders, (e.g. Sparks et al., 1997), but use predefined, often arbitrary definitions of long workhours, ranging from 40 to 60 h per week (e.g. Liu and Tanaka, 2002; Milner et al., 2015), or more than 12 h per day (e.g. Dembe et al., 2005). There is some evidence of a dose response relation ship, however few have modelled workhour limits to capture curvilinear relationships, nor adjust for the complex interplay be tween income, workhours and health that underlie it. Our first hypothesis is that there will be curvilinear workhour and health relationships.

1.2. Gendered time inequality

There are gender differences in who works long or short hours, and this is due to different time demands off the job. In both the US and Australia long hours are predominantly worked by men, especially those in high skilled, well paid occupations (Cha and Weeden, 2014; Wilkins and Wooden, 2014). These are the 'good jobs' which deliver the highest pay and prestige. In contrast, women and low skilled workers predominate in low paid, lower hour jobs (Valletta and Bengali, 2013; Wilkins and Wooden, 2014). Women's over representation in shorter hour jobs is usually because of the care work they shoulder, thus women compete for good jobs and wages while facing greater constraints on their time, a time imbalance apparent not just in Australia but across the OECD (Craig and Mullan, 2010; O'Neill and O'Reilly, 2010; OECD, 2016). Women therefore add paid work time to a greater unpaid time load, a time inequality that has become a core indicator of gender inequality (European Institute for Gender Equality, 2015). The widespread existence of a gendered time inequality raises the possibility that workhour health thresholds are also gendered.

So far, the evidence for gendered workhour health thresholds is mixed. O'Reilly and Rosato (2013) find that working longer than 55 h per week increased mortality risk for men but not women over an 8 year follow up, however women were only a fraction of the long hour group. Similarly, working 51 or more hours per week was associated with higher odds for five of six health outcomes among men, and with only two of six health outcomes among women. Gradients were also observed (working over 41 h), again only for men (Artazcoz et al., 2009). When long hours are classified in a less extreme way, such as working 40 or more hours a week, greater health risks for women have been observed relative to men, sug gesting that detection of health impacts is highly sensitive to hour cut points (Artazcoz et al., 2007; Virtanen et al., 2011). Only two studies have considered how non work time constraints temper the workhour health relationship for men and women. Artazcoz et al. (2007) show that high domestic workloads (>20 h a week) interact with long work hours (>40 h per week) for both men (increasing odds for smoking and poor sleep) and women (increasing odds for physical inactivity). They further find that high domestic workloads constrain women's capability to work long hours (2009).

2. Gender on and off the job

There are other inequalities both on and off the job that could widen gender gaps in workhour health thresholds (Read and Gorman, 2010). Women's jobs tend to be poorer quality, offering them less autonomy, flexibility and security (Charlesworth et al., 2011). Women also tend to work in different occupations relative to men, and in all countries where it is measured women receive less pay and rewards for their work effort (World Economic Forum, 2015). The gender wage gap a form of structural discrimination partially explains gendered disparities in mood disorders in the US (Platt et al., 2016). Such gendered disadvantage in the labour market is paralleled by disadvantage outside of it. Although women may have wider social support networks (beneficial to mental health), employment linked constraints generate other hardships, affecting women's access to financial resources, housing security and safe neighbourhoods (Read and Gorman, 2010). Women's experience of leisure is also different to men's, it is more fractured and combined with other tasks (Chatzitheochari and Arber, 2012). In fact, women and men's care time can also be different in quality as well as quantity, with, for example, men more likely to do more of the enjoyable aspects (such as playing with children) and less of the routine physical care (Craig and Mullen, 2010; Mattingly and Sayer, 2003). Thus, even while combining work with care lowers workhour–health thresholds for every person, men and women experience systematic differences in the quality of their time, as well as other determinants of health, which could widen gendered workhour health thresholds.

3. Endogeneity in the workhour-health relationship

Disentangling the health influence of workhours is complex because health and how long people work mutually influence each other, that is, health is endogenously determined by work time. Thus healthy people are much more likely to work long hours and earn better wages, while unhealthy people curtail their hours or leave the labour market altogether. This creates countervailing in fluences between work time, wages and health (both mental and physical) which few studies systematically address. Grossman and Benham (1974) argue that the simultaneous estimation of three variables workhours, wages and health – is needed to estimate robust workhour health thresholds. This has not, to our knowledge, been undertaken; two studies have used simultaneous estimation techniques but did not control for reciprocal effects of workhours (Grossman and Benham, 1974) and wages (Haveman et al., 1994) on health. We estimate our three equation system using longitudinal data to capture the time dependent relationships among the vari ables, modelling workhours in the quadratic form to identify tipping points.

4. Conceptual model and hypotheses

We propose that there are workhour thresholds beyond which mental health deteriorates and that these depend on resources on and off the job. A key resource is non work time, on which men and women differ because of gender differences in care and domestic workloads. When non work time is constrained, it lowers the point at which paid work hours affect health because of time conflict, fatigue and stress (Artazcoz et al., 2007). Other resources and stresses (both work and non work related) also vary by gender and by work hours and may confound the relationship. These may be income related (wages and hardship), time related (having a partner at home), or social status related (work conditions, occu pational prestige). Together, they represent the systematically different contexts in which men and women engage with the la bour market which, we argue, generates gender differences in workhour health relationships.

Workhour health thresholds may also be lower than previous research suggests because few studies address endogeneity and the healthy worker effect, which bias workhour health estimates. Thus robust, longitudinal estimates are needed that address (a) the way prior mental health affects workhours and wages, (b) health se lection linked to physical health status and behaviours (which can also confound the workhour mental health association) and, (c) differences in time and other resources on and off the job that are characteristic of workforces composed of women as well as men. Addressing all three issues, using representative data for the Australian working age population, we estimate an overall work hour threshold, test for differences by gender, and then explore how these differences reflect time constraints outside of employ ment, and resources on and off the job. Our hypotheses are:

H1. There is a curvilinear association between workhours and health with a threshold beyond which mental health deteriorates (gender, resources and time constraints assumed equal).

H2. There are gender differences in the workhour–health threshold, with the tipping lower for women than for men:

H2.1. There are differential effects of time constraints (as well as covariates) on men and women, and these may widen the gender difference in tipping points.

H3. Care and domestic time constraints underlie gendered workhour–health thresholds.

When care and domestic time is high:

H3.1.1 The workhour health threshold is lower;
H3.1.2 The tipping point is lower for women than for men.

When care and domestic time constraints are low:

H3.2.1 The workhour health threshold is higher;
H3.2.2 Gender differences in thresholds narrow.

5. Method

5.1. Data and sample

5.1.1. Data

We used six waves (wave 5–10) of the Household, Income and Labour Dynamics in Australia Survey (HILDA) data. HILDA is a na tionally representative household based panel study of Australian adults aged 15 years and over that began in 2001 (Wave 1, 7682 households representing 66% of in scope households; 13,969 peo ple interviewed). Every year, the survey asks respondents about their employment and family circumstances, health and socio economic characteristics through face to face interviews and self complete questionnaires. Response rates are consistently high (86% retention in wave 2, above 90% thereafter; see Summerfield, 2011).

5.1.2. Sample

We limited the sample to employed males and females aged 24–64 years who had repeated data on mental health, wages and workhours, and on confounding variables over the 6 year study period. The restrictions excluded most students and retired or semi retired adults to form a sample of adults with established work patterns: 13,171 observations for 3828 males and 13,646 for 4062 females over the six waves. Because of attrition and recruit ment of new respondents, the number of observations varies be tween waves.

5.2. Measures

5.2.1. Simultaneous model outcomes

Five items of the Short Form 36 health status questions (SF 36) assessed *mental health* (Ware et al., 2000). The mental health scale is widely used in population based surveys, performing best among the eight SF 36 health scales in cross sectional and longitudinal analyses of patients with clinical distress (Ware et al., 1995). Three items assess feelings of nervousness and depression ('Have you been a very nervous person?', 'Have you felt so down in the dumps that nothing could cheer you up?' and 'Have you felt downhearted and blue?') and the other two examine peaceful, happy and calm feelings ('Have you felt calm and peaceful?' and 'Have you been a happy person?'). Item responses ranged from 1, 'none of the time', to 6, 'all of the time', which was recoded on a 0 to 100 range with a higher score meaning better mental health. A total mental health score was formed by averaging converted scores (Cronbach's alpha 0.83). *Workhours* were assessed by respondents' reported number of hours usually worked per week in all jobs. *Hourly wage rate* was calculated by dividing current weekly salary and wages from all jobs by weekly workhours.

5.2.2. Stratification variables

Gender (male) was coded 0 for female, 1 for male. *Domestic and care time* was the sum of respondent estimates of the number of hours they usually spent each week caring for own and other's children (on a regular, unpaid basis), caring for disabled/elderly relatives, doing domestic errands, outdoor tasks and doing house work, cooking and laundry. This survey measure of time constraints has been validated against time use data (Strazdins et al., 2016). Gender and domestic and care time were included as covariates in the pooled models. In the modelling, we dichotomised domestic and care time at the median (high if greater or equal to 28 h per week, low otherwise).

5.2.3. Covariates

Pooled and stratified models adjusted for men's and women's sociodemographic characteristics: *Ethnicity* (Non indigenous Australian compared to Aboriginal and Torres Strait Islander, immigrant from other English speaking country and immigrant from non English speaking country); *equivalised household non salary income* (the total household income from all sources excluding own salary/wages, calculated by applying the OECD modified equivalence scale, which assigns a value of 1 to the household head, 0.5 to each additional adult and 0.3 to each child) to control for income from sources other than wages (quintiles 1 highest to 5 lowest); *financial hardship index* (0 lowest to 100 highest, constructed from six items, e.g., 'Could not pay

electricity, gas or telephone bills on time'). We further adjusted for family related variables; *relationship status* (married or de facto versus single); *resident child under 6 years* (1 if yes, 0 otherwise); *partner labour force status* (1 if employed, 0 otherwise). The following work related measures were also included: *work flexibility index* (0 lowest to 100 highest, constructed from three items e.g., 'I have a lot of freedom to decide when I do my work', 'my working times can be flexible' and 'I can decide when to take a break', scale Cronbach's alpha 0.80) and *work intensity index* (0 lowest to 100 highest, three items e.g., 'I have to work fast in my job', 'I have to work very intensely in my job' and 'I don't have enough time to do everything in my job', scale Cronbach's alpha 0.72); working non standard hours (1 yes, 0 no); employment type (on going/casual/fixed term contract); *occupation* (Managers, Professionals, Technicians and Trade Workers, Community and Personal Service Workers, Clerical Workers, Sales Workers, Machinery Operators, and Labourers); *work experience* (years in the workforce – also a proxy for age). Additional controls for health related endogeneity included; *smoking* (never, past and current); *alcohol use* (never drink, rarely/no longer, moderate, heavy); levels of *physical activity* (1 if active, 0 otherwise); *long term health condition* (1 if yes, 0 otherwise) and if this condition restricted employment (*health restriction*). We also adjusted for location of residence: states and urbanity. Finally *lagged outcome variables* were included in the respective simultaneous models (prior mental health, wages, or workhours).

5.3. Statistical approach

We modelled the relationship between workhours and mental health taking into account possible reciprocal effects. Because wages are also likely to affect hours and health (and vice versa), we included them in the modelling using time indexed individual panel data in the following equation system:

$$MH_{i,t} \quad \propto_0 + \propto_t + \propto_1 MH_{i,t-1} + \propto_2 T_{i,t} + \propto_3 T_{i,t}^2 + \propto_4 lnW_{i,t} + \sum_{j\ 5}^{n} \propto_j XH_{j,i,t} + e_{i,t}$$

$$T_{i,t} \quad \beta_0 + \beta_t + \beta_1 T_{i,t-1} + \beta_2 H_{i,t} + \beta_3 lnW_{i,t} + \sum_{j\ 4}^{k} \beta_j XT_{j,i,t} + u_{i,t}$$

$$lnW_{i,t} \quad \gamma_0 + \gamma_t + \gamma_1 lnW_{i,t-1} + \gamma_2 MH_{i,t} + \sum_{j\ 3}^{m} \gamma_j XW_{j,i,t} + v_{i,t}$$

In this system, the three dependent variables are mental health score (MH), number of weekly workhours (T), and log of hourly wage rate (lnW). We also control for covariates (XH, XT, XW) workhours and wages in respective models. The time specific effects on mental health, workhours and wages are captured in $\propto_t, \beta_t, \gamma_t$. Disturbance terms (e, u, v) capture measurement errors and unobserved factors. In each equation, the lagged dependent variable is entered as a predictor to adjust for its past effect and auto correlation (Arellano and Honoré, 2001; Bover, 1991).

In the system, the dependent variables become independent variables in relevant equations to model reciprocal relationships. In the health equation, workhours are entered in a quadratic form to assess non linear impacts and identify the hours – health threshold. We also include different instrumental variables in each equation and exclude some variables that are included in other equations, which enables the system to be identified (Wooldridge, 2002). Specifically, instrumental variables are lagged work hours, log of lagged wage, youngest child less than 5 years old and partner in the labour force (mental health equation); financial hardship, log of lagged wage, lagged mental health (work hour equation), log of lagged wage, partner in labour force, and youngest child less than 5 years old (in the wage equation). Our over identifying tests confirm these instrumental variables are valid.

5.3.1. Pooled and stratified analyses

Pooled and stratified analyses make different assumptions about the way covariates may interplay with time health thresholds. Pooled models assume (or average) the same effects of covariates on the outcome variables by gender, care and domestic time constraints (e.g, the effects on mental health of financial hardship, marriage or their interrelationship is comparable for men and women or by varying time constraints). Gender difference in thresholds in these models were tested by computing an interaction term with work hours. Because squared work hours interactions were not significant, final models only included the gender and linear work hour terms). Stratified analyses allow for differences in the way covariates may affect time health thresholds, capturing in the estimates possible gender (or non work time) differences in contexts and resources that could alter the way covariates influence workhours, mental health or their interrelationship (Wooldridge, 2002).

5.3.2. Estimation methods

Three stage OLS technique (3SLS) controlled for contemporaneous correlations of error terms (Zellner and Theil, 1962). Specifically, in the first stage, mental health, workhours and wages endogenous variables were predicted from all exogenous variables using OLS. In the second stage, the cross equation correlation matrix was estimated using equation by equation residuals. In the final stage, the equations were estimated using predicted values of mental health, workhours and wages in the first stage and the cross equation correlation matrix in the second stage. The system was estimated using an iterated procedure to produce efficient and accurate standard errors (Greenbaum, 1997). We used the Z test for statistical significance (1, 5 and 10%) and confirmed the suitability of our 3SLS approach (see online appendix A.1) using Hansen J and C statistics to confirm the validity of excluded instruments (Baum et al., 2003) and the Breusch Pagan test of independence to show the correlation of error terms across equations (Breusch and Pagan, 1979). We concluded that 3SLS's estimates were more efficient than 2SLS (Wooldridge, 2002).

6. Results

Table 1 presents summary statistics of the key variables for employed men and women. Compared with women, men had similar work experience (also a proxy for age), worked longer hours, earned higher wages, enjoyed more flexibility and less intensity in their jobs, were in higher income quartiles and less likely to be insecurely employed. Women devoted more time to care and domestic work, were likely to report financial hardship, poorer mental health and more chronic health conditions relative to men.

Table 2 reports unadjusted mean mental health score by workhours. Mental health scores were lower (worse) among men or women who work very short hours. Women's mental health scores began to track lower than men's once they worked more than 35 h, a slight drop in men's scores occurred after they worked more than 50 h, yielding preliminary evidence for gendered and non linear workhour–health relationships.

Table 3 summarises the results of the mental health models: Model 1 estimated the average workhour mental health association and threshold, adjusting for gender and covariate differences

Table 1
Summary statistics for men (n 3828) and women (n 4062) in the sample.

	Men (obs 13,171)	Women (obs 13,646)	Difference
	Mean (SD) or %	Mean (SD) or %	p-value
Outcome variables			
Weekly work hours	43.6 (10.7)	33.5 (12.6)	<0.001
Hourly wage rate ($)	24.5 (13.8)	20.9 (10.8)	<0.001
Mental health score	76.6 (14.9)	75.1 (15.5)	<0.001
Non-work time constraints			
High weekly care and domestic hours	34.7	52.0	<0.001
Social-demographic			
Non-indigenous Australian	78.8	78.4	0.418
Indigenous	1.4	1.7	0.051
Other English speaking country	10.5	9.5	0.010
Non-English speaking country	9.4	10.4	0.004
Equivalised household income			
1st quintile (richest)	54.2	26.7	<0.001
2nd quintile	20.4	17.0	<0.001
3rd quintile	13.1	22.4	0.497
4th quintile	7.7	19.0	<0.001
5th quintile (poorest)	4.5	14.9	<0.001
Financial hardship	4.7	5.1	0.029
Family-related			
Married	76.8	71.5	<0.001
Resident child under 6	31.1	41.4	<0.001
Partner in labour force if married	89.5	91.2	0.080
Work-related			
Work flexibility	50.0 (26.4)	46.2(28.4)	<0.001
Work intensity	63.1 (22.1)	65.4 (22.8)	<0.001
Non-standard working hours	30.6 (46.1)	25.7 (43.7)	<0.001
Type of employment contract			
Fixed-term contract	9.5	10.4	0.010
Casual employment	9.9	18.4	<0.001
On-going employment	80.6	71.2	<0.001
Years of work experience	23.0	23.4	0.002
Occupation			
Managers	14.6	8.1	<0.001
Professionals	24.3	32.7	<0.001
Technicians/Trade workers	19.8	3.7	<0.001
Service workers	6.7	13.9	<0.001
Clerical Workers	9.3	25.5	<0.001
Sales Workers	5.1	8.5	<0.001
Machinery Operators	11.7	1.1	<0.001
Labourers	8.5	6.6	<0.001
Health-related			
Long-term health condition	12.7	13.6	0.030
Health-related restriction	7.2	9.2	<0.001
Smoking status			
Never smoked	46.4	52.3	<0.001
Past smoker	28.6	27.8	0.146
Current smoker	25.0	19.9	<0.001
Alcohol consumption status			
Never drank	4.0	6.4	<0.001
Rarely drink/no longer drink	17.4	31.2	<0.001
Moderate drinker	62.9	58.1	<0.001
Heavy drinker	15.7	4.4	<0.001
Physically active (High)	13.2	8.8	<0.001

(hypothesis 1); Model 2 included the interaction term between workhours and gender to test for gender differences (hypothesis 2); Models 3 and 4 report stratified results for men and women respectively, allowing for gender specific associations of covariates (hypothesis 2.1). We followed this sequence stratifying by care and domestic time constraints to estimate average and gender specific thresholds when time constraints are high (hypotheses 3.1.1, 3.1.2; models 5–8) or low (hypotheses 3.2.1, 3.2.2; models 9–12). These analyses enabled us to derive thresholds under different model assumptions, as shown in Fig. 1 (see also online appendix A.2 for formula).

Table 2
Mental health score by workhours, unadjusted, stratified by gender.

	Men (N 13,171)			Women (N 13,646)		
	Mean	SD	N	Mean	SD	N
Workhours per week						
<20	73.5	(17.0)	322	74.2	(15.6)	2056
20 34.9	74.7	(16.4)	788	75.0	(15.6)	3766
35 39.9	76.2	(15.2)	2625	75.1	(15.9)	2914
40 49.9	77.0	(14.7)	5774	75.7	(15.1)	3499
50 or higher	76.9	(14.6)	3675	75.2	(15.5)	1336

Is there is a workhour – health threshold? There was a significant quadratic effect of workhours on mental health (Model 1), shown by a positive coefficient of *workhours* (β_{wkh} 1.027, SE 0.075, $p<0.001$) and a negative coefficient of *workhours squared* (β_{wkhsq} 0.013, SE 0.001, $p<0.001$). This indicated an inverted U shaped relationship between workhours and mental

Table 3
R Summary of workhour regression results in the mental health equation.

Variables	Average estimate		Gender interaction		Stratified: men		Stratified: women	
	Panel a whole sample							
	Model 1		Model 2		Model 3		Model 4	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Workhours *(wkh)*	0.897***	(0.073)	0.964***	(0.091)	1.325***	(0.188)	1.580***	(0.113)
Workhours*Male[a] *(wkhm)*			0.141***	(0.020)				
Workhours squared *(wkhsq)*	−0.012***	(0.001)	−0.013***	(0.001)	−0.014***	(0.002)	−0.023***	(0.001)
R-squared	0.365		0.364		0.376		0.258	
Observations	18,819		18,819		9353		9466	
Panel b high unpaid time								
	Model 5		**Model 6**		**Model 7**		**Model 8**	
Workhours *(wkh)*	1.344***	(0.114)	1.577***	(0.127)	1.752***	(0.331)	2.303***	(0.192)
Workhours*Male [a] *(wkhm)*			0.353***	(0.032)				
Workhours squared*(wkhsq)*	−0.019***	(0.001)	−0.024***	(0.002)	−0.021***	(0.003)	−0.037***	(0.003)
R-squared	0.316		0.547		0.290		0.378	
Observations	8135		6101		6101		6101	
Panel c low unpaid time								
	Model 9		**Model 10**		**Model 11**		**Model 12**	
Workhours *(wkh)*	1.065***	(0.157)	0.643***	(0.159)	1.239***	(0.233)	1.414***	(0.275)
Workhours*Male [a] *(wkhm)*			0.036*	(0.021)				
Workhours squared*(wkhsq)*	−0.012***	(0.002)	−0.007***	(0.002)	−0.013***	(0.002)	−0.017***	(0.003)
R-squared	0.370		0.681		0.051		0.316	
Observations	10,684		8135		8135		8135	

***p < 0.01, **p < 0.05, *p < 0.1.
[a] Note: Linear term for workhours interacted with gender. The mental health equation adjusted for lagged mental health, wages, work flexibility, work intensity, ethnicity, marital status, financial hardship, equivalised household income, employment contract, work experience, work experience squared, occupation, general health status, health restriction, smoking status, alcohol consumption status, physical exercise status, wave, state, urbanity.

health, with a tipping point of 39 h (calculated using the estimated coefficients of workhours and workhours squared), plotted in Fig. 1 (a1). Below this threshold, very short workhours were associated with poorer mental health, with mental health improving as workhours increase. Beyond this threshold, the mental health of the average Australian working adult aged 24–64 deteriorated. The result supported the first hypothesis.

Do thresholds vary by gender, assuming resources and time constraints are similar? In Model 2, the interaction between workhours and gender was significant (β_{wkhm} 0.156, SE 0.020, $p < 0.001$) supporting our second hypothesis that there are different thresholds for men and women. Using coefficients from the pooled analysis we found a five hour gender gap in the tipping point at which mental health deteriorates (43.5 men; 38 women), plotted in Fig. 1 (a2).

Do thresholds change (and gender gaps widen) assuming distinct impacts of resources and time constraints? The stratified models (3 and 4) allowed gender distinctive effects of covariates on mental health and on the workhour mental health relationship to be captured in the estimates. In these models, the hour health association remained quadratic however the thresholds widened compared with Model 2 (now 46.7 h for men and 34.1 for women). The gender gap increased from 5 to 13 h (Fig. 1 a3), indicating that men's and women's resources and time constraints differentially affected workhour health thresholds, amplifying women's workhour health vulnerability.

Do care and domestic time constraints underlie gendered workhour health thresholds? On average, men worked 44 h and spent 21 h on care and housework each week, for women hours spent were 33 and 31, respectively. We hypothesised that if care and domestic time constraints were high, the workhour health tipping point would be lower, irrespective of gender. Stratifying by median (28 h) care and domestic time, we estimated thresholds in a time constrained group. Model 5, like Model 1, averaged across men, women and other covariates to estimate the quadratic relationship. This model found that the thresholds were lower than those estimated by Model 1 (β_{wkh} 1.502, SE 0.117, $p < 0.001$; β_{wkhsq} 0.022, SE 0.001, $p < 0.001$). Adults who combined higher care or domestic workloads with employment showed a nearly six hour lower tipping point of 34.5 weekly hours compared with the average population estimate (Fig. 1 b1).

The next three models tested for gender differences in thresholds among the employed adults who were time constrained. First, we tested for a gender interaction in the pooled analysis (Model 6). The main effects of workhours on mental health were evident (β_{wkh} 1.608, SE 0.127, $p < 0.001$; β_{wkhsq} 0.025, SE 0.002, $p < 0.001$), with a significant interaction between workhours and gender (β_{wkhm} 0.361, SE 0.031, $p < 0.001$). Using these coefficients, the thresholds for time constrained men or women were lower than Model 2 estimates which were averaged by non work time commitments (thresholds reduce by 4 h for men: 39.5, 6 h for women: 32.3) (Fig. 1 b2). These Model 6 estimates assumed other covariates acted similarly for time constrained men and women, so we stratified the sample by gender as in Models 7 and 8. The relationship between workhours and mental health remained curvilinear (Model 7 men: β_{wkh} 2.115, SE 0.342, $p < 0.001$; β_{wkhsq} 0.025, SE 0.004, $p < 0.001$; Model 8 women: β_{wkh} 2.200, SE 0.189, $p < 0.001$; β_{wkhsq} 0.035, SE 0.003, $p < 0.001$) and gender gaps widened. As shown in Fig. 1 (b3), time constrained men had a 42.3 h per week threshold (compared to 46.7 in Model 3) and women a 31.3 h per week thresholds (compared with 34 in Model 4). This widening of the gender gap suggested that the time constraints experienced by men and women differentially shaped workhour mental health tipping points.

Workhour health thresholds among the 'unencumbered'. Employed adults with relatively low care and domestic time constraints reflect the historical composition of the labour force. We hypothesised that among this non time constrained group, the point at which workhours eroded health would be higher and

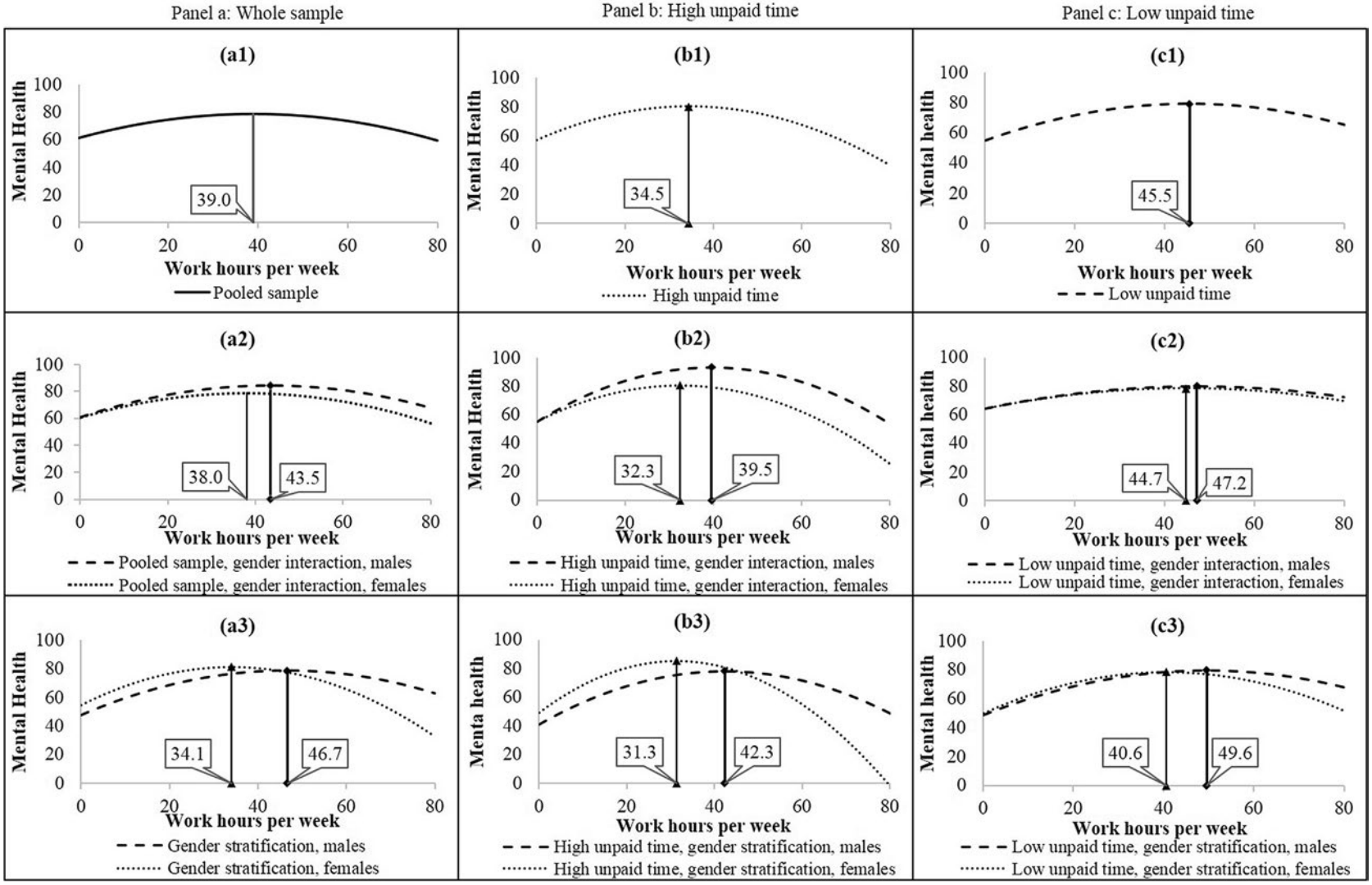

Fig. 1. Predicted mental health score against workhours, showing differences by gender and unpaid time.

closer to the current maximum hour threshold, women's work hour–health threshold would also be comparable to men's. The next analyses (Models 9–12) followed the same sequence as Models 5–8. Model 9 shows that the quadratic effects of workhours on mental health held for those with lower care and domestic workloads (β_{wkh} 1.151, SE 0.161, $p<0.001$; β_{wkhsq} 0.013, SE 0.002, $p<0.001$). This resulted in an average threshold of 46 h, higher than the population average of 39 estimated in Model 1. Model 10 however found no significant gender interaction; assuming covariates act similarly, men and women without time constraints worked similar hours before they compromised their mental health.

Table 7.S compares 'unencumbered' men with women by covariates, showing that even under conditions of similar, time constraints off the job, women are paid less, have lower household income, are less likely to be married, and work in jobs with less flexibility or security and more intensity relative to men. Stratifying by gender revealed quadratic effects of workhours on mental health by gender (men: β_{wkh} 1.290, SE 0.239, $p<0.001$; β_{wkhsq} 0.013, SE 0.002, $p<0.001$; women: β_{wkh} 1.745, SE 0.284, $p<0.001$; β_{wkhsq} 0.021, SE 0.003, $p<0.001$) which translated into different gender thresholds. In the stratified analysis, working more than 49.6 h a week for men and 40.6 h a week for women led to a deterioration in their mental health. The hour gap became significant when the models did not assume the covariates acted similarly in the way they shaped the work hour health relationship, and as for all other models, the threshold for women was lower than the threshold for men.

6.1. Sensitivity analyses

Spline analyses confirmed the non linearity of the workhour mental health relationships (Supplementary Table 1). We also reran analyses using age instead of work experience, and adjusting for number of hours in care and domestic work: results remained similar (Supplementary Table 2.S, 3.S, 4.S).

7. Discussion

How many hours men and women work determines their income and labour market success. We find that it also determines their health, in gender distinctive ways. Our study supplies one of the most robust estimates to date of the curvilinear nature of the workhour health relationship. We show that there are identifiable tipping points beyond which working longer comprises mental health. Furthermore, we show that for the average Australian adult aged 24–64, these hour health tipping points are 10 h lower than current regulatory standards, and lower again for women and employees with care and domestic responsibilities. Within an affluent, developed economy such as Australia, there is a workhour health trade off that is socially patterned. It is likely to be systematically disadvantaging women and caregivers, generating labour market based health inequalities.

Only when we estimated thresholds on men or women whose non work time was relatively unconstrained, and when we assumed all covariates acted equally, did thresholds approximate the current maximum hours standard. Thus an 'unencumbered' worker who lacks significant care or other responsibilities may be able to work up to a 46 h week without incurring health costs. These unencumbered workers may have predominated in generations when fulltime breadwinners were supported by a fulltime care givers, but they are no longer representative of the contemporary workforce. Now, women's participation rate is just 10–20 percentage points lower than men's in developed nations, and it is likely to increase. Our study shows that, in the today's labour market, current workhour regulations will not protect women's health or any adult who combines work with significant care giving.

Although few studies have addressed endogeneity the way we have, our results are consistent with extant research. The curvilinear relationship explains the apparent evidence paradox whereby both underemployment and overemployment is associated with poorer mental health (e.g. Dooley, 2003; Karsten and Klaus, 2009; Kleiner et al., 2015). Our study extends Kleiner and Pavalko's (2010) and Milner et al.'s (2015) research who, like us, identify optimal workhour–mental health limits of about 40 h a week in the US and 35–40 h in Australia, respectively. Milner et al. (2015) also showed that the decline in mental health after 40 h was sharpest amongst women, consistent with the gender differences we found. Similarly, Kleiner and Pavalko (2010) found gender distinct thresholds, but this was in relation to low hours whereby men working full time hours reported better mental health than part time counterparts, a pattern likely due to endogeneity. No previous study has addressed the interplay and reverse relationships between workhours, wages and health as we have done, nor modelled longitudinally a fundamental reason for gender differences: non work time constraints.

7.1. Study limitations

A strength of our study was the longitudinal, simultaneous approach with instrumental variables to address endogeneity. However we did not deal with the possible correlation between unobservable time invariant individual specific characteristics and outcome variables via a fixed effect model. We dichotomised unpaid time into high and low to estimate how work hour thresholds changed. This approach minimised variability in the way non work time constraints might modify workhour thresholds.

We found that gendered thresholds persisted in the high and low time constrained group, even after adjustment for number of care or domestic workhours, when models did not assume covariates acted similarly by gender. Possibly this is due to unmeasured variables, it could also be due to qualitative differences in time demands outside of work, and due to differences in the way covariates shape the worktime–health relationship. As well as constrained time, women live in poorer households, work in worse jobs and receive less pay, thus women engage with the labour market with fewer resources off the job and receive fewer resources on the job, and this may be why their workhour health thresholds are lower.

We adjusted for a wide range of covariates to address confounding, health selection and endogeneity. These covariates have complex relationships with health and our approach may have over adjusted potential indirect effects. Thus financial hardship could impact on mental health directly, be a driver of long work hours, and could also be a consequence of short work hours.

Although our sample was broadly representative of employed Australian adults, the generalizability of our thresholds needs to be tested in nations with different workhour regulations and gender regimes. In Australia, it is normative for men to work long fulltime hours and women to work parttime, especially once they are parents. In countries where men do more childcare and household work (and work hours are less polarized by gender) workhour health thresholds for women may rise, even while men's thresholds may go down. Either way, our study indicates that if both men and women were to more equally share care and household tasks, a 48 h maximum workhour limit would not be protective.

7.2. Contribution

A first contribution is methodological. By using the simultaneous equation approach, we took into account reverse effects of

health on workhours to achieve more accurate estimates of how workhours impact health. Many social determinants are likely to embed complex reverse or reciprocal relationships whereby health is both an outcome and a driver of disadvantage, and there have been repeated calls to address them (Kawachi, 2006). Our meth odology presents techniques suitable for survey and observational data, widely used within economics and applicable to population health. These approaches, we believe, could help improve estimates of the social determinants of health where longitudinal data is available. Second, modelling workhours continuously (and not categorically) revealed a curvilinear, inverted U shape relationship with health. Such an association helps explain the paradoxical findings in the literature that under as well as over employment affects health. We show workhours are neither linearly or uni formly bad for health but have a distinct tipping point, which is critical for informing workhour regulation and can be relatively easily calculated.

A second contribution is to extend theory and present new ev idence on how the labour market generates and maintains gender and health inequalities. Landivar (2015) shows in her cross national analysis how long workhours and lack of regulation drives cross national gender differences in labour market participation. Cha and Weeden (2014) show that in countries where long hours un derpin success and pay premiums, they widen gender inequality in wages. Our study highlights another way one of the most funda mental dimensions of employment work time – is shaping gendered health inequality, through gendered time health trade offs. Even while women and men both rely on the labour market for their income and financial security, we show that under current workhour regulations women's mental health is likely to be compromised if they work the same hours and therefore seek to earn the same wages as men. Although nearly two thirds of women are in the labour market, expectations regarding work time and work effort have remained relatively unchallenged they continue to reflect and expect the capabilities of a worker who is unen cumbered. We show that these expectations translate into a health disadvantage that reinforces women's labour market disadvantage, a connection very few analyses have made.

Our sequenced analyses explored how the gendered health disadvantages embedded in workhour health thresholds vary by care and domestic time constraints, explaining why they occur and building the evidence for time as a social determinant of health. We show the following: adults with care and domestic time constraints have a lower hour health threshold (34.5 h) compared with adults with few care and domestic constraints (46 h). Men's workhour health threshold lowers if they also have care and domestic time constraints, in both pooled and stratified analyses. When models assume 'ideal and unencumbered' contexts and circumstances the gender gaps in workhour–health thresholds disappear, evidence that there is no innate, gender linked difference. In reality however women and men engage with the labour market with different resources and different time constraints, and they gain from it different rewards. The impact this has on workhour health thresholds are revealed in the stratified analyses where a 13 h health advantage for men in Australia is apparent. Our study re inforces the importance of time, health, and their interplay, as key dimensions to gender inequality.

7.3. Conclusion and implications

Economic and political pressures to deregulate labour markets and working time show no sign of abating. Our study points to the way current workhour standards are based on outdated assump tions of labour market composition and gendered divisions of care. Many countries prohibit working time of greater than 48 h per week, specify minimum daily and weekly rest periods away from work, and mandatory rest breaks on the job. Such workhour standards offer some protection, but workhour expectations for many well paid and skilled jobs continue to embed a health trade off that systematically disadvantages women and any adult who combine working with caregiving. There is an hour glass ceiling for those who have care, and if this is not addressed then women will be choosing between working longer hours and compromising their mental health to earn equal income, or working fewer hours than men and entrenching gender inequality.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.socscimed.2017.01.024.

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Overwork and the Slow Convergence in the Gender Gap in Wages

Youngjoo Cha[a] and Kim A. Weeden[b]

Abstract

Despite rapid changes in women's educational attainment and continuous labor force experience, convergence in the gender gap in wages slowed in the 1990s and stalled in the 2000s. Using CPS data from 1979 to 2009, we show that convergence in the gender gap in hourly pay over these three decades was attenuated by the increasing prevalence of "overwork" (defined as working 50 or more hours per week) and the rising hourly wage returns to overwork. Because a greater proportion of men engage in overwork, these changes raised men's wages relative to women's and exacerbated the gender wage gap by an estimated 10 percent of the total wage gap. This overwork effect was sufficiently large to offset the wage-equalizing effects of the narrowing gender gap in educational attainment and other forms of human capital. The overwork effect on trends in the gender gap in wages was most pronounced in professional and managerial occupations, where long work hours are especially common and the norm of overwork is deeply embedded in organizational practices and occupational cultures. These results illustrate how new ways of organizing work can perpetuate old forms of gender inequality.

Keywords

gender wage gap, long work hours, overwork, gender inequality, stalled revolution

Over the past three decades, many indicators of gender inequality have shown signs of slowing or even stalled convergence: women's labor force participation has leveled off (Bureau of Labor Statistics 2012), the integration of occupations has slowed (Hegewisch et al. 2010), and egalitarian gender attitudes are no more prevalent now than they were in the mid-1990s (Blau, Brinton, and Grusky 2006; Cotter, Hermsen, and Vanneman 2011). Perhaps no indicator has received as much attention as the gender gap in wages, which, after declining rapidly in the 1970s and 1980s, narrowed only modestly in the 1990s and remained stable through the mid-2000s (Blau 2012; Blau and Kahn 2006; England 2010). These observed trends belied empirical predictions based on late-twentieth-century data (e.g., Shannon and Kidd 2003) and led to a reframing of scholarly debates, from whether women were "destined for equality" (e.g., Jackson 1998) to why the gender revolution stalled (e.g., England 2010).

The stalled convergence in the gender gap in wages is especially puzzling in light of the

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many social, demographic, and economic changes that, all else being equal, should have attenuated gender inequality in labor market outcomes: the convergence, and for recent birth cohorts reversal, of the gender gap in college completion; the decline and delay in women's fertility; the convergence in men's and women's continuous labor force experience; the decline of manufacturing and other relatively high-paying jobs in traditionally male sectors; and the weakening of male-dominated unions (Blau and Kahn 2006; DiPrete and Buchmann 2013; Goldin, Katz, and Kuziemko 2006). Prior efforts to understand this puzzle have focused on the "stalled revolution" in the domestic division of labor (Hochschild and Machung [1989] 2003; see also Bianchi et al. 2012; Geist and Cohen 2011); the uneven or incomplete adoption of effective anti-discrimination, diversity, and family-friendly personnel policies (e.g., Dobbin, Kim, and Kalev 2011; Hirsh 2009; Kelly 2010; Williams, Blair-Loy, and Berdahl 2013); deep-rooted cultural beliefs about gender differences in competencies that affect labor supply and demand in high-paying occupations and that often become embodied in organizations (e.g., Acker 1990; Ridgeway 2011); and persistent gender segregation in the workplace (e.g., Charles and Grusky 2004; Weeden and Sørensen 2004).

We build on these general lines of inquiry but shift attention to a more proximate factor affecting trends in the gender gap in wages: changes in the social organization of work, specifically the increasing prevalence of long work hours ("overwork," defined as 50 or more hours per week) and the growth of relative wages associated with overwork. These changes have occurred against a backdrop of persistent and largely stable differences in the proportion of men and women who are willing or able to put in long hours at work. This stability in the gender gap in overwork, when coupled with the rising payoff of overwork, had the net effect of raising men's wages relative to women's, thereby slowing the convergence in the gender wage gap. Moreover, because occupations differ in the extent to which overwork is embedded in their cultures, identities, and work practices, the impact of changes in overwork on trends in the gender gap in earnings varied substantially across occupations. We argue that the relative prevalence of overwork in professional and managerial occupations, and the astonishing growth in the wage returns to overwork in these occupations, can help us understand the essentially constant gender gap in these occupations over the past 20 years.

We assess the relationship between trends in overwork and trends in the gender wage gap using Current Population Survey (CPS) data from 1979 to 2009, supplemented by data from the Survey of Income and Program Participation (SIPP). Our analyses feature a graphical description of trends and formal wage decompositions. These decompositions allow us to tease apart the effects of changes in overwork from the effects of changes in standard covariates of wages, and changes in men's and women's distribution across high- and low-paying occupations. More importantly, they allow us to understand the structural source of the overwork effect, in particular whether it stems from changes in the gender gap in overwork, changes in the relative wages associated with overwork, or both. We first offer these analyses for the labor market as a whole, examining both gross and within-occupation effects. We then examine how changes in overwork affected trends in professional and managerial occupations compared to other occupations.

DIFFUSION OF OVERWORK AND THE GENDER GAP IN WAGES

The proportion of Americans who work long hours has increased substantially over the past 30 years. In the early 1980s, fewer than 9 percent of workers (13 percent of men, 3 percent of women) worked 50 hours per week or more (see, e.g., Jacobs and Gerson 2004). By 2000, over 14 percent of workers (19 percent of men and 7 percent of women)

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worked 50 hours per week or more. Overwork began to decline in the mid-2000s, but it remains widespread today.

The trend toward long work hours reflects a normative change as well as a behavioral shift. Not only does a greater proportion of workers put in long work hours per week, but long work hours have also become embedded in organizational practices (Sharone 2004), workplace cultures (Roth 2006), and beliefs about what it means to be an ideal worker in the contemporary economy (Williams 2000). Many employers expect workers to be available whenever clients or supervisors need them, and companies facilitate this 24/7 availability by encouraging or subsidizing the use of mobile communication technologies. Employees are also complicit in ratcheting up expectations surrounding work hours, often treating long work hours as a way to signal loyalty and commitment to an organization or occupation and as a source of status in and outside of work (Blair-Loy 2003; Epstein et al. 1999; Jacobs and Gerson 2004; Sharone 2004).

The effect of the diffusion of overwork on trends in the gender gap in wages depends, logically, on two factors: changes in the relative proportions of men and women who overwork, and changes in the wage returns to overwork relative to full- or part-time employment. These two components may reflect quite different underlying processes. Changes in the gender gap in the proportion of overworkers are intimately tied to the division of household labor and social expectations surrounding men's and women's caregiving and breadwinning roles. Changes in the wage returns to overwork, by contrast, reflect processes of labor market restructuring and workplace reorganization that alter the financial rewards associated with overwork. Although conceptually distinct, these two structural components are interdependent: the effect of a change in the gender gap in overwork on the gender gap in wages depends on whether overworkers receive a wage premium or a wage penalty compared to full-time workers. Similarly, the effect of a change in the relative wages accruing to overwork on the gender gap in wages depends on the direction and magnitude of the gender gap in overwork. In the following sections, we discuss potential sources of change, or lack thereof, in each component.

Persistent Gender Gaps in Overwork

In a counterfactual world in which men and women are equally likely to work long hours, the rise in overwork and its associated wages would increase levels of wage inequality but have no effect on the gender gap in wages. We know that this counterfactual does not hold. A much lower proportion of women than men work long hours: women are less likely to enter jobs that require extremely long work hours (Epstein et al. 1999; Hochschild and Machung [1989] 2003; Williams 2000), and they are less likely to stay in such jobs (Cha 2013; Stone 2007).

Most explanations for women's underrepresentation among overworkers point to women's greater responsibility for family caregiving (Blair-Loy 2003; Cha 2010, 2013; Clarkberg and Moen 2001; Hochschild and Machung [1989] 2003; Jacobs and Gerson 2004). Although men now spend more time on housework and childcare than in the past (Bianchi et al. 2012; Raley, Bianchi, and Wang 2012), essentialist beliefs about female caregiving continue to be a dominant cultural ideology even among people who endorse gender egalitarianism (Cotter at al. 2011). As a result, decisions about childrearing and family activities still tend to be made and implemented primarily by women (Crittenden 2002; Hochschild and Machung [1989] 2003; Stone 2007), women spend the same or a greater amount of time with their children as they did in prior decades (Bianchi et al. 2012), and the rising time requirements of elder care also disproportionately fall on women's shoulders (Wolff and Kasper 2006).

These gender-specific expectations create stickiness in the gender gap in overwork. Indeed, as we will show, although the proportion of men and women who work long hours increased in the 1980s through

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the mid-2000s and declined thereafter, the gender *gap* in overwork stayed remarkably constant. Assuming overwork pays more per hour than full-time work, the lack of convergence in the gender gap in overwork will perpetuate the aggregate gender gap in wages, ceteris paribus. The gender gap in overwork can lead to a further increase in the gender wage gap if hourly wages of overworkers increase more than those of full-time workers. We discuss potential sources of this change in *wage returns* to overwork in the next section.

Rising Returns to Overwork

Much prior scholarship argues that overwork is an increasingly important signal of worker productivity and commitment to jobs (Blair-Loy 2003; Epstein et al. 1999; Jacobs and Gerson 2004; Sharone 2004). If true, it is reasonable to assume that the wage payoff to overwork has increased relative to full- or part-time work. Despite recent attention to the emergence of nonstandard work hours and their wage implications (e.g., Kalleberg 2001, 2011; Kalleberg, Reskin, and Hudson 2000; Presser 2005), there is surprisingly little systematic evidence about trends in the wages associated with overwork. In one of the few exceptions, Kuhn and Lozano (2008) report rising wage returns to overwork, but their data end in the early 2000s and are restricted to male workers.

Although the relevant empirical record is thin, we have good reason to anticipate that wage returns to overwork have been rising. One reason is a simple composition effect: the average hourly wage returns to overwork may have increased simply because of shifts in the types of workers who overwork and in the types of occupations where overwork is most prevalent. Overwork is more concentrated among highly educated, professional, and managerial workers (Kuhn and Lozano 2008); these workers experienced the greatest wage growth in the past 35 years (Weeden et al. 2007). If overwork has disproportionately increased among college-educated or professional or managerial occupations, the average hourly wage returns to overwork may have increased simply due to compositional shifts among overworkers. Empirically, this argument implies that rising returns to overwork will disappear in models that adjust for individual workers' human capital attributes and their occupations.

Aside from such composition effects, several other plausible mechanisms imply rising wage returns to overwork. First, growing productivity differences between overworkers and full-time workers may generate rising relative returns to overwork. These productivity differences may emerge because rising demand for skilled labor creates additional incentives for the most productive workers to put in long hours or because workers who put in long hours were most able to benefit from new, productivity-enhancing technologies. Either way, the observed association between overwork and pay should become increasingly positive as this "skill-biased technological change" (see Acemoglu 1998; Katz and Murphy 1992) proceeds.

A similar empirical pattern is anticipated by the diffusion of tournament compensation systems (e.g., "up or out" promotion systems in law and academia, sales competitions, and some CEO pay systems), in which workers' relative rank, rather than their absolute output, determines pay (Lazear and Rosen 1981; for a recent review, see Connelly et al. 2014) and in which small differences in productivity can result in large differences in pay. In these organizational contexts, employers may rely on work hours as a proxy for productivity because differences in actual productivity are often very small or difficult to measure, creating greater incentives for employees to ratchet up their time at work to "win" the competition and the greater rewards that follow (Biggart and O'Brien 2010; Blair-Loy 2003; Epstein et al. 1999; Landers, Rebitzer, and Taylor 1996; Sharone 2004).

Finally, macrostructural shifts such as deindustrialization, globalization, and the emergence of shareholder value systems pressured employers to stratify their workforces

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into core employees who work long hours for relatively high pay and contingent workers who work part-time, under subcontracts, or in temporary positions for lower pay (Fligstein and Shin 2004; Kalleberg 2001; Kalleberg et al. 2000; Tilly 1996). This bifurcation of the labor market may have raised the relative pay of overworkers while lowering the hourly wages of contingent workers.

For our purposes, it matters less *which* of the preceding mechanisms drives rising returns to overwork than that at least one mechanism does. Regardless of its source, any increase in wage returns to overwork will affect trends in the gender gap in wages. Because a greater proportion of men than women overwork, an increase in the hourly wage returns to overwork relative to full-time work will widen the gender gap in wages. Conversely, a decline in the relative wages of overwork will compress it. Rising wage returns to overwork can affect gender wage gap trends even if the gender gap in overwork remains unchanged.

OCCUPATIONAL HETEROGENEITY IN OVERWORK

In this section, we argue that the overwork effect differs substantially across occupations, and such heterogeneity can also help us understand cross-occupational differences in trends in the gender gap in wages. As we will demonstrate, the slowdown in the convergence of men's and women's wages was especially pronounced in professional and managerial occupations. These occupations are precisely those in which convergence in men's and women's educational attainment and continuous labor force experience should, in theory, generate an especially sharp decline in the gender wage gap.

One answer to this puzzle, we argue, is the counteracting effects of overwork. Professional and managerial occupations have long been understood to be "greedy" occupations that "seek exclusive and undivided loyalty" from members, including in work hours (Coser 1974:4; see also Epstein et al. 1999; Jacobs and Gerson 2004). To the extent that norms of the ideal worker are especially embedded in professional and managerial identities and organizational practices, we might also anticipate the greatest conflicts with middle-class norms of "intensive mothering" (Hays 1998; Lareau 2003). Professional and managerial women are also especially likely to have overworking spouses, whose limited contributions to non-work responsibilities restrict women's availability for overwork (Cha 2010). It should thus come as little surprise that the gender gap in overwork is especially pronounced in these occupations and shows little sign of convergence over the period of our data (see also Jacobs and Gerson 2004).

Should we likewise anticipate (1) a higher wage premium to overwork in professional and managerial occupations than in other types of occupations and (2) a sharper increase in these wage premiums? The answer to the first question is, we think, unclear. On the one hand, there is no guarantee that long work hours in greedy occupations will necessarily result in an hourly wage premium. Because professionals and managers are typically salaried, people who work long hours out of loyalty to their occupation or organization, professional identity, or other forms of intrinsic motivation could very well earn *lower* hourly pay than professionals and managers who "merely" work full-time at the same salary (if employers do not adjust overworkers' salaries to compensate for the extra time) or, at best, equivalent hourly wages (if employers adjust overworkers' salaries to compensate for their time, but no more). On the other hand, professional and managerial tasks are typically unstandardized and often carried out in teams, making individual productivity and contributions to organizational profits especially difficult to detect, and the costs of monitoring employees to reduce shirking are especially high. In this context, employers are more likely to use work hours as a signal of productivity (Landers et al. 1996; Sharone 2004). If overworking employees are disproportionately rewarded through better work assignments and more frequent

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promotions (Biggart and O'Brien 2010; Blair-Loy 2003; Epstein et al. 1999; Landers et al. 1996), this will lead to disproportionately higher relative wage returns to overwork in professional and managerial occupations than in other types of occupations.

Even if the valence of the overwork wage premium at baseline is unclear, we think there is reason to anticipate that *trends* in the wage payoff to overwork are more extreme in professional and managerial occupations. The emergence of "winner-take-all" labor markets (Frank and Cook 1995) and tournament models of compensation has been most pronounced in professional and managerial occupations, thereby increasing the potential rewards to acquiring "superstar" status within firms and raising incentives for the most productive workers to work long hours. Similarly, global competition and labor market restructuring, which put pressure on employers to have a flexible labor force, may have encouraged a more stratified labor market even in the same occupations, in which a core group of professionals and managers work ever longer hours and secure ever higher pay, and peripheral or contract employees (e.g., freelance accountants or legal consultants from a staffing company) work in temporary or fixed-term contracts (Kalleberg 2011). This, too, would raise the wages of overworkers relative to full-time workers, creating an upward trend in wage returns to overwork.

The upshot is that the diffusion of overwork and its effects on the gender gap in wages will, we think, be especially pronounced in professional and managerial occupations relative to other types of occupations. In these occupations, overwork is more prevalent, the gender gap in overwork especially large, and the increase in wage returns to overwork especially steep.

DATA, METHODS, AND VARIABLES

To assess the overwork effect on trends in the gender gap in wages, we first present graphs of trends in the gender gap in wages, the gender gap in work hours, and net returns to overwork compared to full-time work. Where these analyses rely on any modeling, they use simple OLS wage regressions. We then offer formal wage decompositions developed by Juhn, Murphy, and Pierce (1991, hereafter JMP; see also Blau and Kahn 2006), which allow us to disentangle the effect of changes in the gender composition of overworkers (the composition or "quantity" effect) and the effect of changes in wage returns to overwork (the price effect) on the gender gap in wages.

Data

The data for our main analyses are the Merged Outgoing Rotation Groups of the CPS (MORG; Bureau of Labor Statistics various years). In our graphical presentation of trends, we use all available MORG surveys from 1979 to 2009. The JMP decomposition relies on the 1979, 1989, 1999, and 2007 surveys; we chose 2007, rather than 2009, as the end point to estimate effects using data from years with similar macroeconomic conditions. Additional analyses use SIPP data from 1996 and 2004 (U.S. Census Bureau n.d.).

Our MORG analytic sample is limited to non-institutionalized civilian workers age 18 to 64 years. Self-employed workers, who were not asked the wage questions, are excluded. We present results based on the edited MORG data series, but we also estimated models using unedited data and found substantively identical results for the variables of interest.[1] The final sample sizes are 4,983,875 for the graphical trend analyses and 627,763 for the JMP decompositions. All analyses use the BLS-provided sampling weights.

Decomposition Method

The JMP decomposition method begins with a wage equation for men and assumes that prices for male workers with the observed human capital characteristics prevail for women if discrimination is absent.[2] The JMP model takes the following form:

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$$y_{it} = \mathbf{x}_{it}\mathbf{b}_t + \sigma_t\theta_t, \quad (1)$$

where y_{it} is the log of wages for individual *i* in year *t;* **x** is a row vector of independent variables; **b** is a column vector of regression coefficients; σ is the residual standard deviation of men's wages for that year, which measures the male residual wage inequality; and θ is a standardized residual with a mean of zero and variance of 1 for each year. The difference in the gender wage gap between two time points, denoted by 0 and 1, can be decomposed into four components (see Blau and Kahn 2006; Juhn et al. 1991):

$$\text{Observed } \mathbf{x} \text{ effect} = (\Delta\mathbf{x}_1 - \Delta\mathbf{x}_0)\mathbf{b}_1 \quad (2)$$

$$\text{Observed price effect} = \Delta\mathbf{x}_o(\mathbf{b}_1 - \mathbf{b}_0) \quad (3)$$

$$\text{Unobserved quantity effect} = (\Delta\theta_1 - \Delta\theta_0)\sigma_1 \quad (4)$$

$$\text{Unobserved price effect} = \Delta\theta_0(\sigma_1 - \sigma_0) \quad (5)$$

In these equations, Δ denotes the average male-female difference in the variable it precedes. Equations 4 and 5 estimate the contribution of price and composition changes in unobserved variables on the changes in the wage gap. The unobserved quantity effect measures the contribution of changing gender gaps in the relative positions (i.e., percentile rankings) in men's residual wage distribution. The unobserved price effect measures changes in the gender gap in wages due to changes in men's residual wage distribution, under the assumption that women's percentile rankings in this distribution remained constant.

We are primarily interested in estimates from Equations 2 and 3. The observed **x** effect (Equation 2) is the portion of the variance explained by changes in the gender gap in the quantity of each observed predictor of wages in **x**. The observed price effect (Equation 3) indicates changes in the gender wage gap due to changes in the price of each predictor. The estimated effects from these equations allow us to evaluate how shifts in the gender gap in overwork or in the relative wages of overwork attenuated or widened the gender gap in wages. These estimates are adjusted for effects of other covariates in **x**, which we describe in the next section.[3]

Variables

The dependent variable in our analyses is hourly wages, which is logged in all multivariate analyses but, for ease of interpretation, unlogged in the descriptive analyses. Following conventional practice, we calculate hourly wages for non-hourly workers by dividing their weekly wages by the number of hours usually worked per week or, where this information is missing, the number of hours worked in the week preceding the survey; we also exclude workers whose wages fall below $1/hour or above $100/hour in 1979 U.S. dollars (Angrist and Krueger 1999; Card and DiNardo 2002). Wages are adjusted for inflation using the Bureau of Economic Analysis's Personal Consumption Expenditures Deflator and expressed in 2004 dollars. Wages that are top-coded in the CPS to preserve confidentiality are multiplied by 1.4 (see, e.g., Card and DiNardo 2002).

Work hours are measured with a set of dummy variables that use standard cut points in the work-family and labor economics literatures: fewer than 35 hours per week (part-time), 35 hours or more but fewer than 50 hours (full-time), and 50 hours or more (overwork).[4] Sensitivity checks using alternative specifications of overwork generated substantively similar results (see Figures S3 to S6 and Table S6 in the online supplement). In our multivariate analyses, we further differentiate part-time workers by reason for working part-time (economic, non-economic, and unspecified or missing).

Other covariates include gender, race, age, age squared, education (five categories), marital status (married or unmarried; not used in the decomposition analysis, see below),

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potential years of work experience (i.e., age – years of schooling – 6), potential work experience squared, region, metropolitan residence, and whether a respondent works in the public sector. Table 1 presents the means and standard deviations of these variables for the survey years used in the JMP decompositions. Table A1 in the Appendix presents these statistics for all survey years.

Some wage equations also fit a series of dummy variables for detailed occupations (e.g., lawyer, carpenter). Because a consistent occupation coding scheme is not available in the MORG series, we use the codes indigenous to each survey: 421 detailed occupations in 1979, 502 in 1989, 496 in 1999, and 500 in 2007. This strategy minimizes the error introduced when reconciling occupation schemes, but at a cost: JMP decompositions require that each year's model fits identical variables. We bypass this problem with a two-step analysis: we regress logged wages on the full set of indigenous occupation dummy variables, and then apply the JMP decomposition to the residuals. The resulting estimates of overwork effects can be understood as lower-bound estimates of the "true" effects of overwork, because only wage differences between overworkers and full-time workers remaining after purging *all* occupation effects can contribute to the estimates of the price and composition effects of overwork.

In our final set of analyses, we present estimates from models applied to data for each of three occupation groups: professionals, managers, and, for comparison, all other occupations.[5] To obtain indicators of professional or managerial occupations that are consistent across MORG surveys, we "backcode" using gender-specific weights to translate 2000, 1990, and 1980 major census occupation classification (COC) codes to a set of 1970 COC codes (see Weeden 2004; see also Weeden 2005a, 2005b). Although aggregating detailed occupations into professional, managerial, and other occupations does not capture the full extent of occupational heterogeneity in work hours or wages, it allows us to identify differences in the overwork effect across the major occupation groups where, according to the occupations literature, "greedy occupations" are most likely to be found.[6]

Our estimates of the overwork effect based on CPS data are adjusted for the usual human capital and occupational covariates in CPS-based wage equations, but they do not include four known correlates of wages: marital and parental status, actual work experience (as opposed to potential experience), job tenure, and union status. We exclude marital and parental status because the JMP models assume that price effects of the observed covariates are the same across groups. Because this assumption does not hold for either marital or parental status (see, e.g., Budig and England 2001; Korenman and Neumark 1991; Waldfogel 1997), inclusion of these variables would produce misleading results.[7] Our CPS models also exclude actual work experience, job tenure, and union membership, because these variables are either not available in the CPS or, in the case of union membership, only available in the later years of the series.[8] To assess whether omission of these covariates biases the estimated overwork coefficients, we also analyze SIPP data, which contain the requisite measures but only cover the period between 1996 and 2004.[9]

RESULTS

We begin with an overview of gross trends in the gender gap in work hours, the gender gap in wages, and net wage returns to overwork. These analyses set the stage for the subsequent JMP decomposition results.

Trends in Overwork and Returns to Wages

Figure 1 shows the trend of the proportion of men and women who worked at least 50 hours per week (panel a) and, for comparison, the proportion who worked full-time

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Table 1. Means and Standard Deviations of Variables Used in the JMP Decomposition

	Men		Women	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Natural logarithm of hourly wages	7.35	.57	7.09	.53
Hourly wages (2004 US$)				
1979	17.59	10.00	11.49	6.09
1989	17.27	11.25	12.61	7.56
1999	18.73	13.43	14.59	9.86
2007	19.96	14.58	16.27	11.55
Overwork (works 50 or more hours per week)				
1979	.15		.03	
1989	.18		.06	
1999	.19		.07	
2007	.17		.07	
Part-time, non-economic reasons	.05		.18	
Part-time, economic reasons	.02		.03	
Part-time, missing reason	.01		.03	
Age	37.65	12.04	37.91	12.19
Black	.10		.18	
Hispanic	.11		.09	
Other race	.04		.04	
High school graduate	.34		.35	
Some college	.26		.30	
College graduate	.17		.18	
Advanced degree	.09		.08	
Potential work experience	18.56	12.23	18.61	12.46
Midwest	.25		.25	
South	.34		.35	
West	.22		.21	
Metropolitan resident	.81		.81	
Public sector	.15		.20	
N	328,564		299,199	

Source: CPS MORG data, 1979, 1989, 1999, and 2007.

(panel b). The key result is that the proportion of workers who put in long hours rose and then fell, but the gender gap in overwork remained remarkably stable. In 1979, 15 percent of men and 3 percent of women worked 50 hours or more per week; by the late 1990s, these percentages increased to 19 and 7 percent for men and women, respectively (see Figure 1a). The rise in overwork reversed for men in the 2000s and stagnated for women, generating a modest decline in the gender gap in overwork after 2000. The overall story, however, is one of stability in the gender gap in overwork, which stands in marked contrast to the narrowing gender gap in full-time work in the first 15 years of our data (see Figure 1b).[10] This result implies that changes in the gender gap in overwork could not have contributed much to trends in the gender gap in wages, a result we unpack further in the JMP decompositions.

Figure 2 maps trends in men's and women's hourly wages for the entire labor force (panel a), full-time workers (panel b), and overworkers (panel c). Figure 2a shows the familiar pattern of gradual convergence in

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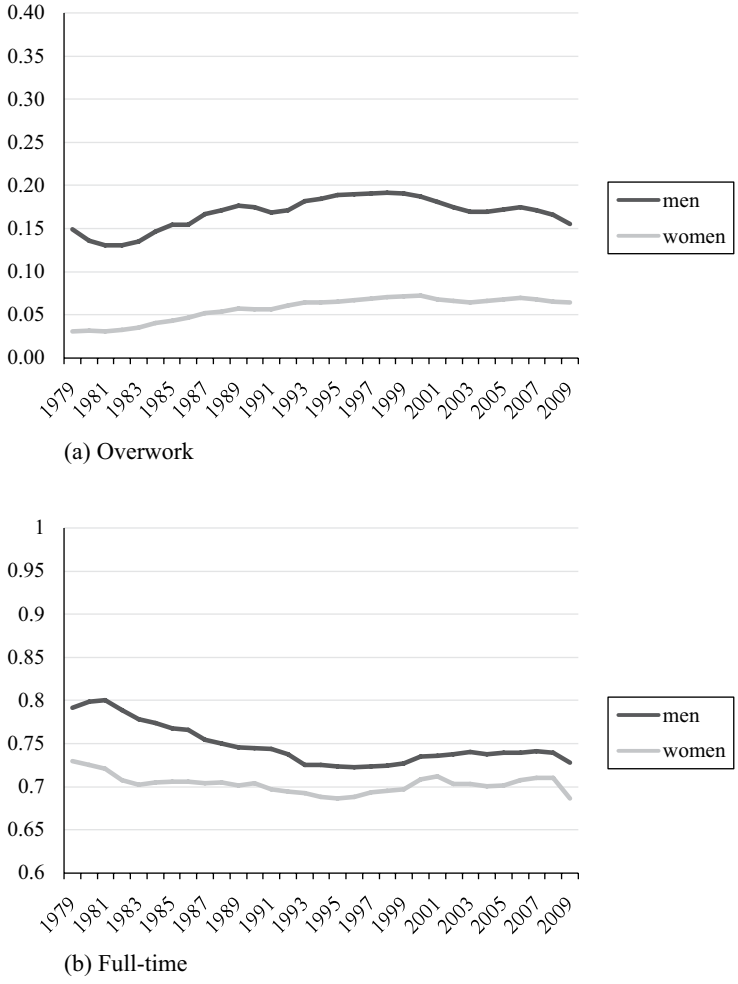

Figure 1. Proportion of Men and Women by Work Hour Status
Source: CPS MORG data, 1979 to 2009.

the gender gap in wages in the 1980s and early 1990s, driven largely by rising wages for women, and stalled convergence in the late 1990s and early 2000s as men's real wages began to rise again (Blau and Kahn 2006). Our extension of this series reveals that the stagnation in the gender gap in wages continued throughout the latter half of the 2000s. More concretely, among all workers, the ratio of women's wages as a proportion of men's increased in the first 15 years of our data from .65 to .78, a change of 20 percent, but in the last 15 years only increased from .78 to .81, a change of 3.8 percent. The gender gap in wages among full-time workers (Figure 2b) shows a similar trend, but with a more substantial narrowing of the gender gap by the mid-1990s. The wage trend for overworkers shows a rather different pattern (see Figure 2c). Overworking men's hourly wages increased in the 1980s, held steady through the mid-1990s, and rose sharply in the late 1990s and again in the late 2000s. Overworking women's hourly wages rose substantially and steadily throughout the three decades

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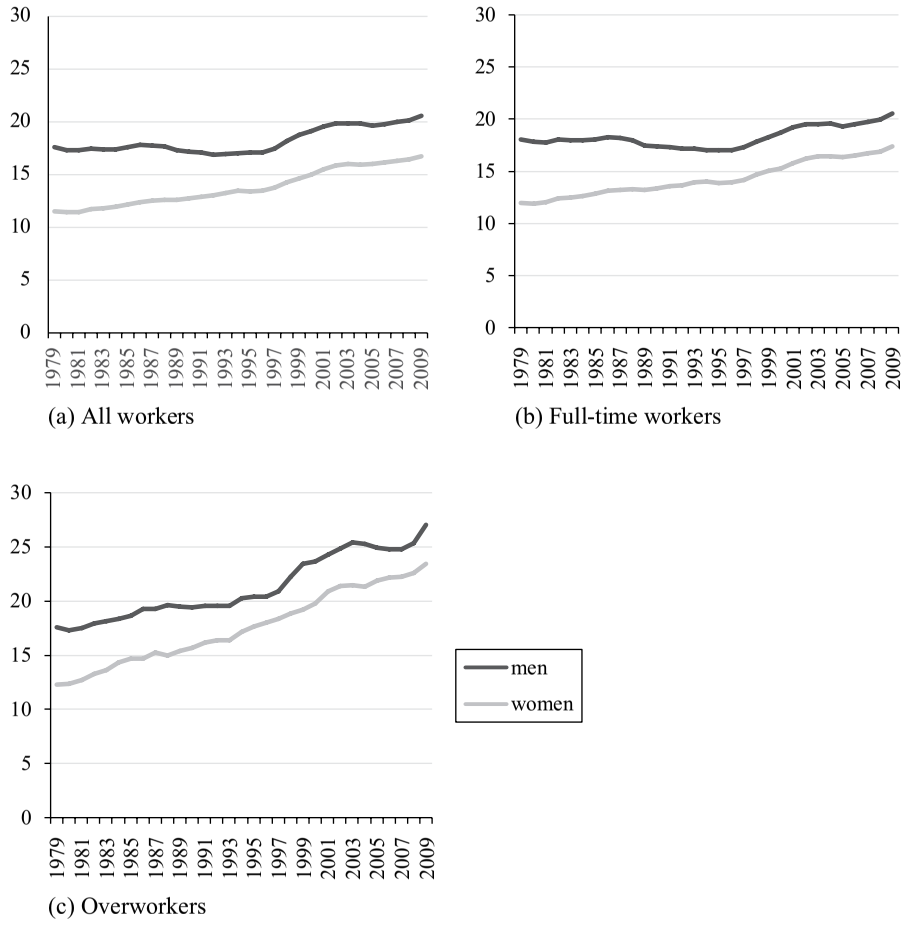

Figure 2. Hourly Wages of Men and Women by Work Hour Status (in 2004 Dollars)
Source: CPS MORG data, 1979 to 2009.

covered by the CPS. For both men and women, wage growth was much steeper for overworkers than for full-time workers.

The trends in Figure 2c may be driven by compositional shifts in the pool of overworkers. If, for example, overwork became increasingly concentrated among college-educated workers, the increase in returns to overwork in Figure 2c will disappear once we adjust for rising returns to a college degree. To assess the impact of compositional changes, we regressed logged wages on a full complement of demographic, human capital, and labor market (e.g., region, sector) covariates (see Table A1 in the Appendix). The exponentiated coefficients of overwork, which represent net hourly wage returns to overwork relative to full-time workers, are graphed in Figure 3a. The overwork coefficients are statistically significant ($p < .05$) in all years except 1994 to 1996 (men) and 1995, 1996, and 1998 (women).

Figure 3a yields three notable findings. First, the slope in adjusted mean hourly wages of overworkers is positive, meaning that the rising wage returns to overwork observed in Figure 2c are not simply a function of compositional changes in the observed human capital attributes of overworkers. Second, within-sex net wage returns to overwork

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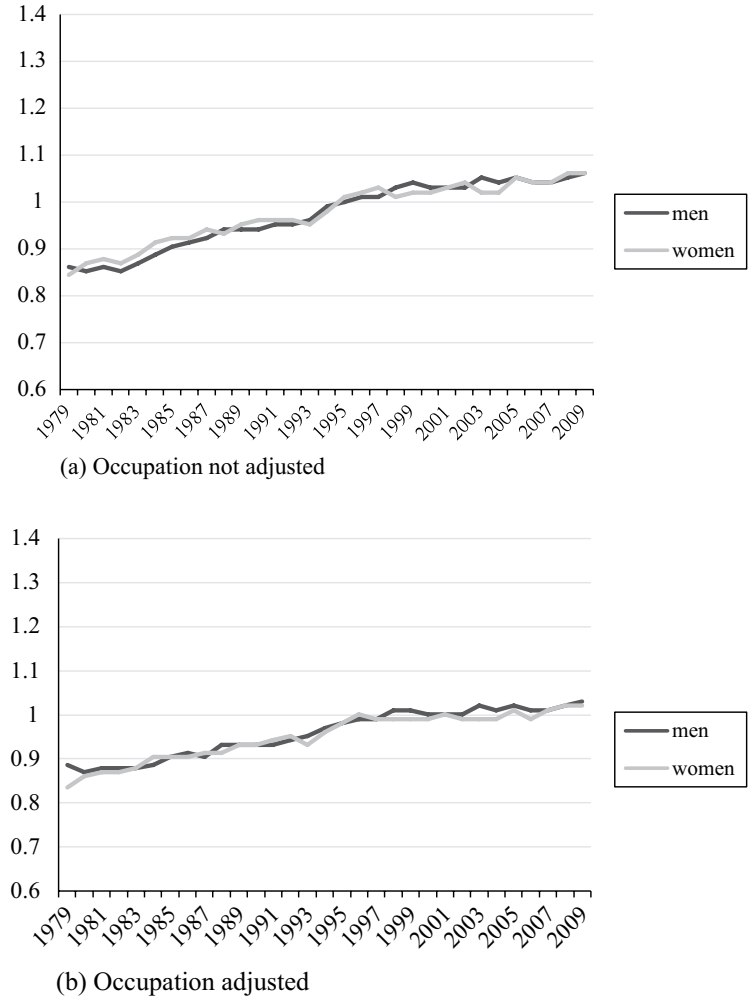

Figure 3. Adjusted Mean Hourly Wages of Overworkers as a Proportion of Full-Time Workers' Wages
Source: CPS MORG data, 1979 to 2009.
Note: Effects are adjusted by demographic and job-related factors (see Table A1 in the Appendix).

do not differ appreciably for men and women. That is, we find no evidence that overworking women are compensated less for their additional hours relative to full-time women than overworking men are compensated relative to full-time men. Third, net wage returns to overwork changed from negative (i.e., a wage penalty) to positive between 1979 and 2009. In 1979, overworkers' hourly wages were lower than those of full-time workers by between 14 (women) and 16 (men) percent.[11] By 1989, this wage penalty for overwork had decreased by a third; by the mid-1990s, there were few differences in the hourly wages of overworkers versus full-time workers; and by 1999, overworking men earned 4 percent *more,* and overworking women earned 2 percent *more,* than their full-time counterparts. Returns to overwork continued to rise thereafter, such that by 2009, the net wage premium for overwork had increased to 6 percent for both men and women. This increase in the overwork wage premium throughout the 2000s extends

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trends reported for men by Kuhn and Lozano (2008), and to our knowledge is a novel finding.

Although the results graphed in Figure 3a adjust for a host of individual-level covariates, they do not adjust for occupation, another potential source of compositional changes that generate rising returns to overwork. Indeed, the proportion of overworkers in professional and managerial occupations increased from .45 to .58 between 1979 and 2009. This is consistent with the claim, bolstered by prior research, that the diffusion of overwork norms was especially pronounced in professional and managerial occupations, but it also leaves open the possibility of a spurious trend in wage returns to overwork if these occupations pay higher wages for reasons unrelated to overwork (e.g., occupational closure or rising demand for professional and managerial skills).

To assess how occupation composition affects trends in returns to overwork, Figure 3b graphs trends in estimated wage returns to overwork based on a model that also includes dummy variables for detailed occupations (coded with the indigenous scheme for each year). These occupation-adjusted coefficients of overwork are statistically significant for all years except 1998 to 2002 (men) and 1996 and 2007 (women). Figure 3b reveals that the increase in the occupation-adjusted wage returns to overwork between 1979 and 2007 is about .15 log points, compared to a .2 log point increase in the unadjusted models (compare Figures 3a and 3b). Put differently, about 30 percent of the increase in the overwork wage premium is associated with occupation composition effects, and about 70 percent is occurring within occupations.

These results offer initial evidence that the trend toward long work hours, coupled with rising returns to overwork and a persistent gender gap in overwork, exacerbated the gender gap in wages. In the JMP decomposition that follows, we estimate the magnitude of the composition and price effects of overwork and compare them to analogous effects of other known covariates of wages.

Decomposition of the Overwork Effect

Table 2 shows the decomposition of changes in the gender gap in wages between 1979 and 2007. Coefficients in the first column are based on a regression of log hourly wages on the work hour variables, age and its square, race, education, potential years of work experience and its square, region, and public sector (see Table 1). Coefficients in the third column also adjust for detailed occupation effects (see Methods section). The regression coefficients used to calculate the decomposition terms are presented in Tables S1 and S2 in the online supplement.

Results in the first column show that the gender wage gap decreased by .21 log points, or about 19 percent, between 1979 and 2007 (see Table 2, "change in differentials"). The increase in overwork exacerbated the gender wage gap, as indicated by the positive coefficients for overwork listed under both "observed price" and "observed **x**" in Table 2. Although the net composition and price factor of overwork widened the gap—both estimated effects are positive—the price effect had a much stronger impact than the composition effect. The increased price for overwork widened the wage gap by .02 log points, or 9.4 percent (.02/.212) of the total change in the gender gap. By contrast, shifts in the gender gap in overwork increased the gender gap in wages by .002 log points, or 1 percent of the total change.

How do the estimated effects of overwork compare to other known factors affecting trends in the gender gap in wages? Although we recognize the peril of entering variables that may be measured with more or less error and precision into a horse race, the decomposition results in Table 2 suggest that overwork had a proportionately greater impact on the gender gap in wages than all other observed price and composition factors except age and potential experience (but see the SIPP results below for these variables). Notably, the inequality-exacerbating effects of overwork entirely offset the inequality-reducing effects of education. Rising returns to

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Table 2. Decomposition of Changes in the Gender Wage Gap, 1979 to 2007

	Model 1		Model 2	
	Occupation Not Adjusted		Occupation Adjusted	
		Percent of the Total Change		Percent of the Total Change
Change in differentials	–.212		.000	.0%
Observed price				
All *b*'s	.005	2.4%	.009	4.2%
Overwork	.020	9.4%	.011	5.2%
Part-time variables	–.002	.9%	.000	.0%
Age variables	.008	3.8%	.006	2.8%
Race variables	.001	.5%	.002	.9%
Education variables	–.014	6.6%	–.006	2.8%
Potential experience variables	–.004	1.9%	–.003	1.4%
Region variables	.000	.0%	–.001	.5%
Metropolitan resident	–.004	1.9%	.000	.0%
Sector	–.004	1.9%	–.001	.5%
Observed **x**				
All *x*'s	–.047	22.2%	–.017	8.0%
Overwork	.002	.9%	.002	.9%
Part-time variables	–.013	6.1%	–.006	2.8%
Age variables	–.057	26.9%	–.023	10.8%
Race variables	–.004	1.9%	–.002	.9%
Education variables	–.008	3.8%	.000	.0%
Potential experience variables	.031	14.6%	.010	4.7%
Region variables	.001	.5%	.001	.5%
Metropolitan resident	.002	.9%	.001	.5%
Sector	.001	.5%	.000	.0%
Unexplained differential	–.170	80.2%	.008	3.8%
Unobserved prices	.023	10.8%	–.001	.5%
Unobserved quantities	–.193	91.0%	.009	4.2%
N		316,893		

Source: CPS MORG data, 1979 and 2007.
Note: Percent figures represent magnitudes of the coefficients relative to the total change noted in Model 1 (–.212).

education equalized the gender gap in wages by an estimated .014 log points, or 6.6 percent of the total change (compared to 9.4 percent for overwork), and the composition effect of education equalized the gender gap in wages by .008 log points, or 3.8 percent of the total change (compared to 1 percent for overwork). Our results suggest that changes in the prevalence and pay associated with overwork are as critical to understanding trends in the gender gap in wages as rising returns to a college degree and the reversal of the gender gap in college completion.

Without downplaying the importance of either overwork or education effects, it also bears noting that most of the change in the gender wage gap between 1979 and 2007 can be attributed to improvement in women's

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unobserved labor market qualifications (see Model 1, Table 2). Unobserved price effects, by contrast, would have widened the gender gap in wages in the absence of compositional shifts. The unobserved effects are greater in magnitude than the observed effects.

It is possible that the estimated overwork effects from Model 1 are simply picking up occupational segregation effects: men and women are unevenly distributed across occupations that differ in their pay. To assess this, Model 2 of Table 2 presents estimates from a JMP decomposition model fit to data residualized on detailed occupations. These analyses provide a lower-bound estimate of the net overwork effect, insofar as residualizing on occupations purges these data of between-occupation differences in overwork and the associated wage trend effects. Coefficients in Model 2 show, first, that the "change in differentials" (i.e., the trend in the gender gap in wages) disappears when we purge between-occupation effects. This is consistent with prior research showing the dominant role of occupational segregation in generating the gender gap in pay (e.g., Blau, Ferber, and Winkler 2009). The unobserved price and composition effects in Model 2 also shrink and reverse sign, suggesting their large negative values in Model 1 are due to gender segregation across occupations.

Of key interest, however, are the price and composition effects of overwork. As in Model 1, the composition effect of overwork on trends in the gender gap in wages is quite small (see Model 2, Table 2). The price effect also remains positive, indicating that shifting prices for overwork exacerbated gender inequality in wages. However, it decreases to .011 log points or 5.2 percent of the total change (.011/.212), compared to .020 log points or 9.4 percent of the total change in Model 1. Put differently, at least half of the overwork effect observed in Model 1 can be attributed to rising prices for overwork within occupations, while just under half is associated with between-occupation effects of differences in pay and the prevalence of overwork.

Timing and Robustness Checks

As we noted in our graphical presentation of results, neither the proportion of overworkers nor the wage returns to overwork show a smooth and steady increase between 1979 and 2007. To assess whether the overwork effect varied by decade, Table 3 presents models analogous to Model 1 of Table 2 for three time periods: 1979 to 1989, 1989 to 1999, and 1999 to 2007. These results show that the overwork price factor exacerbated the gender gap in wages in the 1980s (.011 log points, or 10 percent of the total change in the gender wage gap during this period) and 1990s (.011 log points, or 18 percent of the total change in the gender wage gap during the 1990s), but had virtually no effect on the gender gap in wages in the 2000s. In decade-specific models fit to data from which occupation effects have been purged (not shown), the price effect of overwork is positive but reduced by 30 (1990s) to 40 (1980s) percent. These findings suggest that rising wage returns to overwork was a major contributor to the slow convergence of the gender gap in pay in the 1980s and 1990s. Borrowing Blau and Kahn's (1997:4) analogy, in the earlier periods, women were "swimming upstream" against the adverse effect of overwork: in a counterfactual world in which the wage premium for overwork stayed constant, the gender gap would have narrowed by an additional 10 percent in the 1980s and 18 percent in the 1990s.

In the 2000s, by contrast, neither the overwork price effect nor the overwork composition effect had an appreciable impact on trends in the gender gap in wages (see Table 3, columns 5 and 6). Although it is not widely appreciated in the work hours literature, overwork began to decline during this decade, especially among men (see Figure 1a), with a corresponding decrease in its impact on aggregate wage inequality. The growth in the net wage premium for overwork also leveled off in the 2000s, compared to the sharp increase of two prior decades (see Figure 3). The impact of trends in overwork on trends in the gender gap in wages was

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Table 3. Decomposition of Changes in the Gender Wage Gap, 1979 to 1989, 1989 to 1999, and 1999 to 2007

	1979 to 1989		1989 to 1999		1999 to 2007	
Change in differentials	–.109		–.062		–.042	
Observed Price						
All *b*'s	.018	16.5%	.002	3.2%	.002	4.8%
Overwork	.011	10.1%	.011	17.7%	.000	.0%
Part-time variables	–.002	1.8%	–.009	14.5%	.000	.0%
Age variables	.000	.0%	.001	1.6%	.005	11.9%
Race variables	.000	.0%	.000	.0%	.001	2.4%
Education variables	.001	.9%	–.001	1.6%	–.003	7.1%
Potential experience variables	.000	.0%	.000	.0%	–.002	4.8%
Region variables	.000	.0%	.000	.0%	.001	2.4%
Metropolitan resident	.000	.0%	.000	.0%	.000	.0%
Sector	–.002	1.8%	.001	1.6%	–.001	2.4%
Observed **x**						
All *x*'s	–.023	21.1%	–.014	22.6%	–.028	66.7%
Overwork	.000	.0%	.000	.0%	–.001	2.4%
Part-time variables	–.004	3.7%	–.005	8.1%	–.005	11.9%
Age variables	–.030	27.5%	–.011	17.7%	–.015	35.7%
Race variables	–.002	1.8%	.001	1.6%	–.003	7.1%
Education variables	–.002	1.8%	–.006	9.7%	–.011	26.2%
Potential experience variables	.016	14.7%	.007	11.3%	.007	16.7%
Region variables	.000	.0%	.001	1.6%	.000	.0%
Metropolitan resident	.001	.9%	.000	.0%	.000	.0%
Sector	.000	.0%	.000	.0%	.000	.0%
Unexplained differential	–.104	95.4%	–.050	80.6%	–.015	35.7%
Unobserved prices	.022	20.2%	.000	.0%	.008	19.0%
Unobserved quantities	–.126	115.6%	–.050	80.6%	–.024	57.1%
N	319,797		310,870		307,966	

Source: CPS MORG data, 1979, 1994, and 2007.
Note: Percent figures represent magnitudes of the coefficients relative to the period-specific total change.

thus minimal. Instead, the story of the 2000s seems to be the diminishing effect of wage-equalizing composition changes in unmeasured attributes (see Table 3, "unobserved quantities"). Further analysis (not shown) reveals that these unmeasured attributes are strongly associated with detailed occupations, such that the composition effect in the 2000s reverses valence once detailed occupation effects are purged from the data.

We also assess the robustness of our results to biases generated by three known correlates of wages that are not available in the CPS data, but that are plausibly associated with overwork: union membership, actual work experience, and job tenure. Our strategy is to analyze SIPP data from 1996 to 2004 and compare these results to an analysis of CPS data from the same years.

The SIPP data show that declining gender gaps in job tenure and union membership, when coupled with wage premia for union membership and for job tenure, narrowed the gender wage gap, as shown by the composition effects (see Table A2 in the Appendix). Rising prices for each additional year of actual work experience widened the gender wage gap by .005 log points, or 18 percent of the

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total change in the SIPP data. A decrease in the gender gap in years of work experience, however, compressed the gender wage gap by .006 log points, or 21 percent of the total change in the SIPP data. In the CPS data, by contrast, *potential* work experience appeared to compress the gender gap in wages through price effects but widen the gender wage gap through composition effects. The SIPP data also show a smaller estimated price effect, a larger composition effect, and a larger combined effect of education than do the CPS data.

Critically, the SIPP and CPS data reveal a very similar pattern of overwork price and composition effects between 1996 and 2004. Neither dataset reveals evidence of an overwork composition effect. The overwork price effect in the SIPP data (.005) is comparably sized to the overwork price effect in the CPS data (.004). It is possible, of course, that estimates from both datasets are biased by unobserved heterogeneity. Even so, the SIPP results are comforting insofar as they demonstrate that the CPS estimates of the overwork price and composition effects are not biased by the absence of measures of union membership, job tenure, or actual work experience in the CPS.

Overwork in Professional and Managerial Occupations

Our final analysis shows that the overwork effect is most pronounced in professional and managerial occupations. We note, first, that trends in the gender gap in wages differ substantially between professional, managerial, and other occupations. In the professions (see Figure 4a), women earned 70 percent of male wages in 1979, a gap that is narrower than for the labor force as a whole. However, the trend in the gender gap in wages was especially flat in the professions: the gender gap remained stable until the late 1980s, narrowed by the mid-1990s, but *increased* throughout the late 1990s before leveling off in the 2000s. In managerial occupations (Figure 4b), the trend in the gender gap in wages tracked the overall trend, but the magnitude of the gender gap was substantially greater than it was in the professions: in 1979, female managers earned 62 percent of male managers' wages, and by 2007, they earned 73 percent of male managers' average wages. The trend in the gender gap in wages in the residual category of "other occupations" (Figure 4c) mirrors the overall trend.

The takeoff in overwork was also more pronounced in professional and managerial occupations. In 1979, 18 percent of men and 8 percent of women in professional occupations overworked; by the late 1990s, these percentages increased to 25 and 12 percent, respectively (see Figure 5a). The rise in overwork in managerial occupations was greater, increasing from 31 percent of male managers in 1979 to 39 percent in 1999, and from 10 percent of female managers in 1979 to 16 percent in 1999 (Figure 5b). The decline in overwork in managerial occupations in the early 2000s was also more pronounced than it was in the professions (compare Figures 5a and 5b). The trend for other occupations (Figure 5c) is less dramatic: the proportion of overworkers is lower throughout, the increase through the 1980s and 1990s smaller, and the post-2000s decline relatively modest. Although the size of the gender gap in overwork varies substantially across the three occupation groups, with the greatest gap in managerial occupations and the smallest in the "other" occupation group, the gender gap in overwork remained fairly stable in each occupation group, with the notable exception of some compression of the gender gap in overwork in managerial occupations between 2000 and 2009 (see Figure 5b).

Figure 6 graphs trends in the overwork wage premium or wage penalty in these three occupation groups after adjusting for demographic and job-related covariates (see Table A1 in the Appendix) and pooling data for men and women to minimize noise. We note, first, that adjusted hourly wage returns to overwork were, on average, lower than hourly wage returns to full-time work in all three occupation groups in the early 1980s, with the overwork wage penalty especially

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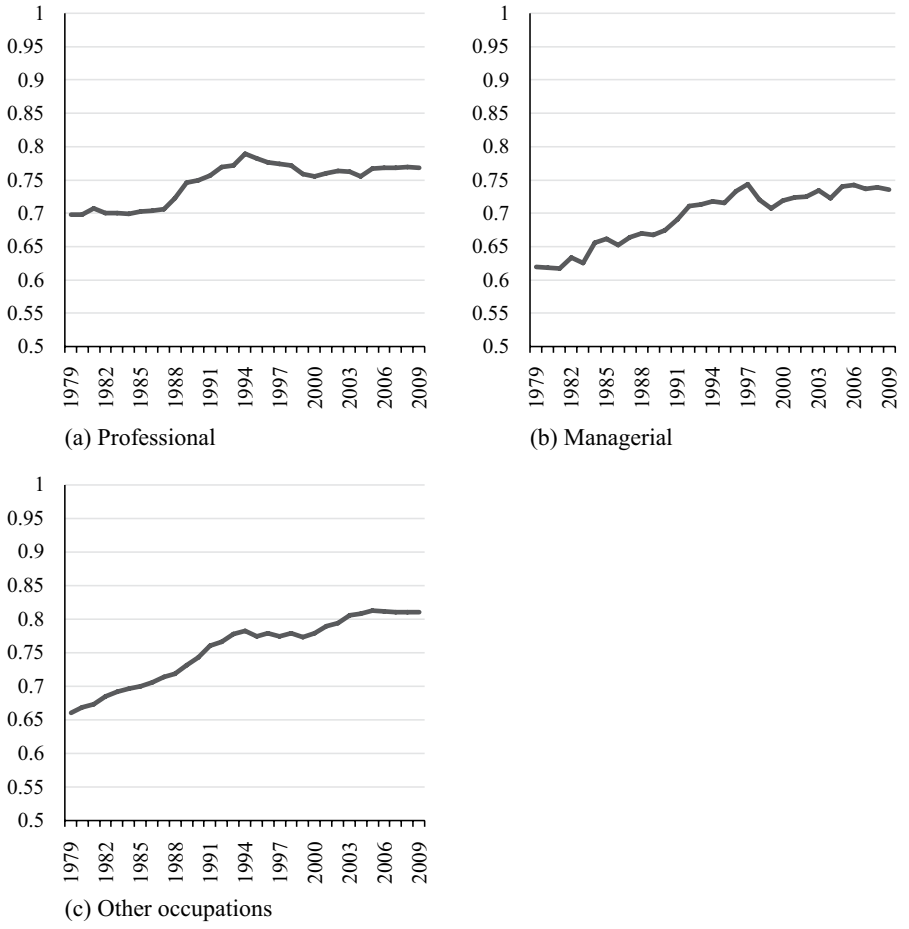

Figure 4. Women's Mean Hourly Wages as a Proportion of Men's by Occupation Group
Source: CPS MORG data, 1979 to 2009.

pronounced in the professions and management. This wage penalty for overwork is not surprising, given that professionals and managers are typically salaried but work the longest hours. What is surprising is the astonishing growth in wage returns to overwork in these occupations, where the wage returns to overwork increased by approximately .20 log points, compared to other occupations, where wage returns increased by .15 log points. By 2009, professionals' wage penalty for overwork decreased to 4 percent from 24 percent in 1979, and overworking managers earned 11 percent *more* than their full-time counterparts by 2009, up from a 9 percent wage penalty in 1979. This implies that the increase in the wage premium for overwork in professional and managerial occupations had a greater inequality-exacerbating effect on the gender gap in wages in these occupations. Moreover, the greater prevalence of overwork and the larger gender gaps in overwork in managerial and professional occupations implies that the rising payoff to overwork had a stronger effect on the gender gap in wages in these occupations.

Table 4 formalizes this result, presenting JMP decompositions for the three occupation groups. (The regression coefficients used to calculate the decomposition terms are

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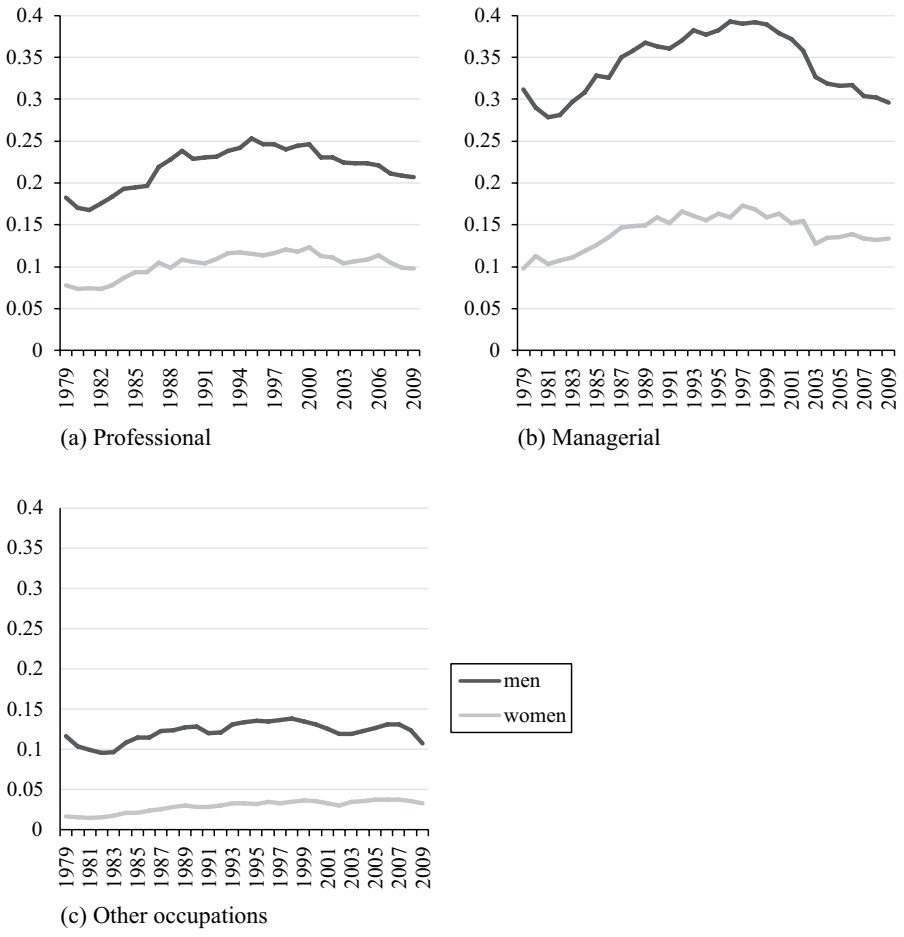

Figure 5. Proportion of Men and Women Who Worked 50 Hours or More by Occupation Group
Source: CPS MORG data, 1979 to 2009.

presented in Tables S3 and S4 in the online supplement.) Between 1979 and 2007, the gender wage gap declined in all three occupation groups (see Table 4, row 1). Convergence in the gender wage gap was more dramatic in managerial occupations (16 percent) than in professional occupations (8 percent), but less than the 17 percent decline in other occupations. As we observed in the full sample, changes in the composition effect of overwork in the three occupation groups are quite small (see Table 4, row 3), ranging from .5 percent (other occupations) to 4 percent (managerial occupations) of the occupation-specific change in the gender pay gap.

The composition effect of overwork is dwarfed by the price effect (Table 4, row 2). As we anticipated, the overwork price effects in professional and managerial occupations are especially large. In absolute terms, this price effect is greater in managerial occupations (.034 log points) than in professional occupations (.024 log points). As a percentage of total change in the gender gap in wages, the price effect is greater in professional occupations (30 percent) than in managerial occupations (20 percent). Put differently, if overwork prices had remained constant (and all other covariates' price and composition effects were unchanged), the gender gap in wages would

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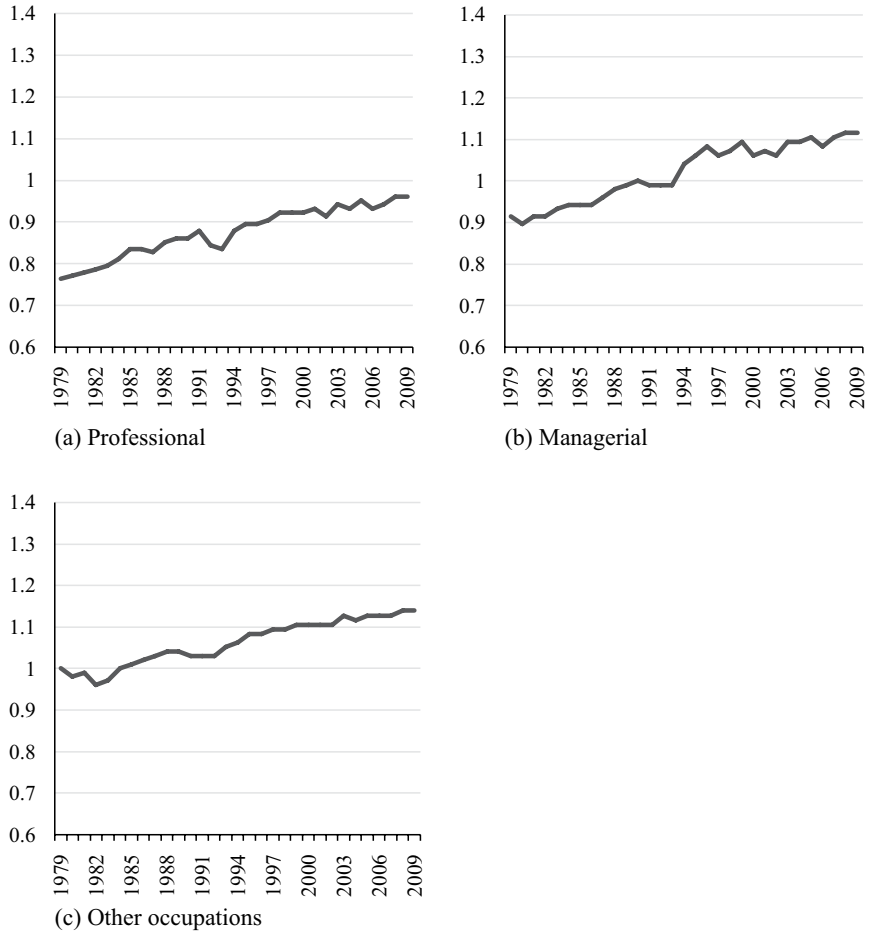

Figure 6. Adjusted Mean of Overworkers' Hourly Wages as a Proportion of Full-Time Workers' Wages, by Occupation Group
Source: CPS MORG data, 1979 to 2009.
Note: Effects are adjusted by demographic and job-related factors (see Table A1 in the Appendix).

have declined by 20 percent more in managerial occupations than we observed in the data, and by a third as much in professional occupations. In other occupations, the price effect for overwork is more moderate (.017 log points), accounting for 9 percent of the total change in the gender gap in wages.

CONCLUSIONS

This article documents a strong empirical relationship between trends in overwork and trends in the gender gap in wages. The shift toward long work hours exacerbated the gender gap in wages, partially offsetting wage-equalizing trends in men's and women's educational attainment and labor force experience. Between 1979 and 2007, the growing prevalence of overwork exacerbated the gender wage gap by about 10 percent of the total wage gap, a magnitude comparable to the inequality-reducing effect of the convergence in the gender gap in education and rising returns to a college degree in our CPS data.[12] For all the attention devoted to education and labor market experience in the gender inequality literature, our findings show that growing work hours and compensation of

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Table 4. Decomposition of Overwork Effect on the Gender Gap in Wages by Occupation, 1979 to 2007

	Professionals		Managers		Others	
		% of Total Change		% of Total Change		% of Total Change
Change in the gender wage gap	−.081		−.171		−.189	
Overwork price	.024	29.6%	.034	19.9%	.017	9.0%
Overwork quantity	−.001	1.2%	.007	4.0%	.001	.5%

Source: CPS MORG data, 1979 and 2007.
Note: Each decomposition model also fits the variables listed in Table 1.

overwork is equally important to understanding trends in the gender wage gap.

The main source of this overwork effect on the gender gap in wages did not stem from changes in the gender gap in overwork. This gap remained essentially constant over the data period. Rather, it was driven by an increase in wage returns to overwork relative to full-time work, an increase that in some occupations meant a change between a wage penalty (i.e., negative wage returns) for overwork in the 1980s to a wage premium by the 1990s. The takeoff in the hourly wages associated with long work hours was sufficient to exacerbate the gender gap in wages by an estimated 9.4 percent of the total change between 1979 and 2007.

Trends in overwork and their effect on the gender gap in wages are especially consequential for understanding the especially slow change in the gender wage gap in managerial occupations and the slight *increase* in the gender wage gap in the professions since the early 1990s. This stagnation is especially puzzling because these occupations are most likely to require a college degree, meaning that the rapid convergence, and for younger cohorts reversal, of the gender gap in college degree attainment should have led to unusually rapid wage convergence in these occupations. We show that this puzzle is in large part due to the effect of overwork in these occupations, where levels of overwork are high, the gender gap in overwork large, and the growth in net wage returns to overwork dramatic. Indeed, if hourly wage returns to overwork had remained constant between 1979 and 2007 (but effects of other factors remained as observed) the wage gap would have narrowed by an additional 30 percent among professionals and 20 percent among managers, compared to 9 percent in other occupations.

We also show that price changes of overwork are especially important in understanding gender wage gap trends in the 1980s and 1990s. In these two decades, which were characterized by a dramatic increase in the prevalence of overwork, the magnitude of the overwork price effect was between 10 and 18 percent of the total change in the gender gap in wages for each period (see Table 3). As important as these findings are for establishing an overwork effect on the gender gap in wages, we readily concede that our findings do not explain why convergence in the gender gap in wages all but stalled in the 2000s. During this period, overwork began to decline, and its contribution to trends in the gender wage gap likewise diminished.

Why, then, did the gender gap in wages stall in the 2000s? Our results provide some clues, although no complete answers. None of the observed covariates in the CPS do much to explain the stagnation in the gender wage gap in the 2000s, nor do the additional covariates (actual experience, job tenure, and unionization) in the SIPP data. Instead, this stall seems largely due to the reduced pace of integration of occupations (see Table 3). A second clue emerges from a supplementary analysis of the data from the 2000s (not shown), which continue to show a positive

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price effect of overwork for parents but not for other workers. This finding is, we think, consistent with the argument that "egalitarian essentialism"—an ideology that emphasizes equal rights but is combined with gender essentialist beliefs about intensive mothering (Charles and Grusky 2004; Cotter et al. 2011; Hays 1998)—now prevails. In the context of rising relative wages for overwork, gender essentialism about caregiving may exacerbate the motherhood penalty in wages and stagnate the gender wage gap trend by limiting mothers' ability to benefit from these rising prices.[13]

Our results also highlight the importance of a broader question for students of labor markets: *Why* did the hourly wages for overwork increase so spectacularly? Does this increase in the payoff for overwork reflect a change in organizational compensation practices and occupational norms about work hours, or "merely" rising productivity differences between those who overwork and those who do not? Three empirical patterns in our data suggest the trend is not driven solely by productivity changes: (1) hourly wage returns to overwork were lower than those of full-time work for professionals (in all years) and managers (during the 1980s); (2) the increase in wage returns to overwork was steepest in professional and managerial occupations, where overwork is especially prevalent; and (3) the steepest growth in wage returns to overwork occurred in the occupation decile groups with the highest proportion of overworkers (see Figure S7 in the online supplement). If wage premiums or rising wage returns for overwork solely reflect marginal productivity, one would not anticipate *negative* wage returns to overwork in the professional and managerial occupations at baseline, nor that trends in wage returns to overwork map onto the prevalence of overwork. These patterns are anticipated, however, if rising returns to overwork reflect rising expectations that workers in already-greedy occupations will put in long hours, and that compensation systems penalize workers who fail to meet these expectations and reward those who win the work hours game (see, e.g., Epstein et al. 1999; Landers et al. 1996).

Neither the diffusion of overwork nor changes in the relative pay of overwork took place in a vacuum. Instead, these are part of a broader constellation of changes in the social organization of work driven by macroeconomic shifts. Increased domestic and international competition has introduced new ways of organizing work as employers lay off large numbers of employees to downsize their labor force while expecting higher productivity from the survivors (Bluestone and Rose 1997; Kalleberg 2011). Global markets, and the new technologies that make them possible, have created a 24/7 economy and increased the demand for employees who can be on call any time, any day (Presser 2005). These changes have increased work hours, at least for some workers, and also ratcheted up expectations surrounding what it means to be an ideal worker.

Many of these changes in the social organization of work, including expectations surrounding work hours, appear at first glance to be gender neutral. Employers do not specify separate work hour expectations for their male and female employees, nor do they systematically reward men who overwork more than women who overwork, relative to their full-time counterparts. Nevertheless, overwork rests on a social foundation that is itself highly gendered: employees who work long hours can only do so with the support of other household members, usually women, who shoulder the lion's share of unpaid-work obligations (Acker 1990; Hochschild [1989] 2003; Lips 2013; Ridgeway 2011). Under this system, women are less likely than men to be able to work long hours or to enjoy the rising wage payoff to long hours. The emergence of long work hours as part of the "new normal" in some occupations, the professions and management in particular, builds on and perpetuates old forms of gender inequality.

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APPENDIX

Table A1. Means and Standard Deviations of Variables, All CPS Years

	Men		Women	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Hourly wages, logged	7.34	.58	7.09	.54
Hourly wages (2004 U.S. pennies)	1828.39	1258.03	1400.09	947.59
Overwork (usually works 50 hours or more)	.17		.06	
Part-time, non-economic reasons	.05		.18	
Part-time, economic reasons	.02		.04	
Part-time, missing reasons	.01		.03	
Age	37.57	11.90	37.84	12.02
Married	.72		.74	
Black	.10		.13	
Hispanic	.12		.09	
Other race	.04		.04	
High school graduate	.34		.35	
Some college	.26		.30	
College graduate	.17		.18	
Advanced degree	.09		.08	
Potential work experience	18.45	12.06	18.52	12.29
Midwest	.24		.24	
South	.34		.35	
West	.22		.21	
Metropolitan resident	.81		.81	
Public sector	.15		.20	
N	2,580,696		2,403,179	

Source: CPS MORG data, 1979 to 2009.

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Table A2. Decomposition of Trends in the Gender Wage Gap, 1996 to 2004: SIPP and CPS

	SIPP		CPS	
Change in differentials	–.028		–.029	
Observed price				
All *b*'s	.016	57.1%	.008	27.6%
Overwork	.005	17.9%	.004	13.8%
Part-time variables	.005	17.9%	.001	3.4%
Age variables	.003	10.7%	.009	31.0%
Race variables	.001	3.6%	.000	.0%
Education variables	–.001	3.6%	–.004	13.8%
Experience variables	.005	17.9%	n/a	
Potential experience variables	n/a		–.004	13.8%
Region variables	.000	.0%	.000	.0%
Metropolitan resident	.000	.0%	.000	.0%
Sector	.000	.0%	.002	6.9%
Union	.000	.0%	n/a	
Job tenure variables	–.002	7.1%	n/a	
Observed **x**				
All *x*'s	–.034	121.4%	–.019	65.5%
Overwork	.000	.0%	.000	.0%
Part-time variables	–.003	10.7%	–.005	17.2%
Age variables	–.001	3.6%	–.016	55.2%
Race variables	–.003	10.7%	–.001	3.4%
Education variables	–.012	42.9%	–.005	17.2%
Experience variables	–.006	21.4%		.0%
Potential experience variables	n/a		.009	31.0%
Region variables	.000	.0%	–.001	3.4%
Metropolitan resident	.001	3.6%	.001	3.4%
Sector	.001	3.6%	.000	.0%
Union	–.003	10.7%	n/a	
Job tenure variables	–.007	25.0%	n/a	
Unexplained differential	–.011	39.3%	–.018	62.1%
Unobserved prices	–.001	3.6%	.003	10.3%
Unobserved quantities	–.010	35.7%	–.021	72.4%
N	77,373		302,423	

Source: SIPP 1996 and 2004; CPS MORG data 1996 and 2004.

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Notes

1. The imputation method the BLS uses in the edited series to assign earnings to missing data can bias downward the estimated effects of variables that are excluded from the imputation equations or "hot deck" cell definitions (e.g., detailed occupation). This "match bias" is likely increasing over time as the percentage of cases with missing earnings grows (Heckman and LaFontaine 2004; Hirsch and Schumacher 2004). Given our goal, however, the edited earnings series is appropriate.

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2. We also estimated JMP models using wage equations based on (1) price effects for women and (2) price effects for pooled data. These analyses (available from the first author) yield estimates of our core variables that do not differ appreciably from those presented here.
3. Standard errors for decomposition terms are not typically reported in the JMP decomposition. Instead, the significance of the effects is tested for the regression coefficients of the wage equation (see Tables S1, S2, S3, and S4 in the online supplement [http://asr.sagepub.com/supplemental]).
4. Among overworkers, men worked an average of 55.8 hours per week (sd = 8.4) and women an average of 54.8 hours per week (sd = 8.1) (see Table S5 and Figures S1 and S2 in the online supplement).
5. In additional analyses (not shown) we further differentiated the "other" occupation group into component major occupations (e.g., craft, clerical). The cross-group differences in trends are modest and tangential to this article.
6. In theory, we could backcode to the detailed occupation level and examine trends at this level. However, aside from the noise that backcoding inevitably introduces, most occupations contain too few cases in a given year or cluster of years to generate robust estimates. Professional and managerial occupations contain the majority (68 percent) of workers whose occupations fall at or above the 75th percentile in the prevalence of overwork.
7. If we include parental status in our JMP decomposition models, we would in effect be assuming the price effect of motherhood is positive, and that an increase in the proportion of mothers in the labor pool would narrow the gender wage gap. Neither assumption is tenable. We therefore omit marital and parental status in our wage regression models, allowing overwork to be endogenous to these variables. This means our overwork estimates are likely to capture any overwork-wage association driven by gender-differentiated caregiving responsibilities. A separate analysis of data from 1984, when parental status is first available in the MORG, to 2007 shows that changes in the price of overwork had a greater effect on the gender wage gap among parents than among childless workers, and that composition effects slightly narrowed the gender gap in wages among parents.
8. Union membership is first available in the 1983 MORG data. A supplementary analysis of 1983 to 2007 data shows that the decline of unionization narrowed the gender wage gap but did not appreciably alter the overwork effect: the coefficient of the overwork price effect declines from .018 to .016, and the coefficient for the composition effect remains the same (see Table S7 in the online supplement).
9. SIPP panels prior to the 1996 panel are not entirely comparable with later panels.
10. The gender gap in part-time work also decreased over this period, although less sharply than the gender gap in full-time work (result not shown).
11. The wage penalty for overwork reflects the long work hours of salaried workers, who are not covered by the Fair Labor Standard Act overtime provision. In our supplementary analysis, we re-estimate the overwork effect on weekly earnings for the subset of respondents excluding hourly workers. These results show the wage premium for overwork in all years and yield the substantively same conclusion (see Figure S6 and Table S6 the online supplement).
12. As we noted earlier, the relative magnitude of the overwork effect is smaller in later years but still substantial enough to offset 38 (SIPP) to 44 (CPS) percent of the education effect (see Table 3 and Table A2). The smaller relative effect of overwork is also due to the larger education effect in later years: the gender gap in education narrowed and reversed especially quickly during the 2000s, further reducing the relative size of the overwork effect.
13. Budig and Hodges (2010) report that the motherhood wage penalty is smallest in the upper income deciles, where professionals and managers are overrepresented. One might wonder if this is inconsistent with our finding, which shows the greatest inequality-exacerbating effect of overwork on the gender wage gap trends in professional and managerial occupations. Unlike Budig and Hodges (2010), our primary focus is on the relationship between *changes* in the adjusted price and composition of overwork and *changes* in the gender gap in wages. Also, the motherhood wage penalty may be generated by many mechanisms (e.g., unobserved human capital, selection into motherhood, or discrimination), not just mothers' lower representation among overworkers.

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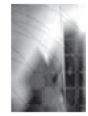

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The gender gap in employment hours: do work-hour regulations matter?

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Abstract

In all developed countries, women, especially mothers, work fewer paid hours than their spouses. However, the magnitude of the gender gap varies significantly by country, ranging from 2 to 20 hours per week in this study. Using data from the 2002 International Social Survey Programme, this article investigates whether work-hour regulations have a significant effect on household allocation of paid labour and gender work-hour inequality. Two main types of work-hour regulations are examined: standard weekly work hours and the maximum allowable weekly work hours. Results show that households in countries with shorter maximum weekly work hours had less work-hour inequality between spouses, as each additional allowable overtime hour over the standard working week increased the work-hour gap between couples by 20 minutes. These results indicate that couples' inequality in work hours and gender inequality in labour supply are associated with country-level work-hour regulations.

Keywords

employment, family policy, gender, work hours

Introduction

In the context of growing female labour force participation, family policies and work-hour regulations have received significant attention. 'Family-friendly' policies, such as parental leave and childcare, help reconcile labour force participation with family responsibilities and the limitation of work hours prevents employment from encroaching too much on family or personal time. While the effects of these policies have clear implications for individual work hours, these policies have not been assessed for their

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potential to generate or ameliorate inequality in paid work hours at the national level. The work-hour gap between couples is underutilized as an indicator of gender inequality despite having serious implications. Work hours are correlated with income (Rosenfeld and Kalleberg, 1990) and are an essential component of the wage gap, are linked to opportunities for promotion and advancement at work (Maume, 1999) and affect the power to bargain for a desired level of housework and childcare responsibility (Brines, 1993). Furthermore, work hours are linked to benefits offered at work, such as health care, vacation and retirement (OECD, 2002). Large work-hour discrepancies between men and women reinforce other types of inequalities.

A substantial body of literature addresses gender inequality within households. However, it is imperative to consider social structure in addition to individual household dynamics. Blau and Kahn (1992) find that the gendered wage gap stems from two different factors: 'gender-specific factors' and overall 'wage inequality'. Blau and Kahn argue that there is inequality in how men and women are paid (gender-specific factors), but an important source of inequality in wages is attributable to the wage structure. That is, countries that have less centralized wage bargaining and impose a low minimum wage threshold will exhibit larger wage inequalities. Because women are disproportionately distributed towards the bottom of the wage structure, there is a greater gender gap in wages as a product of greater inequality overall. The logic is similar for work hours. Women are disproportionately likely to work fewer hours than are men. Countries that do little to limit work-hour differences, either through regulations on allowable work hours or incentive mechanisms to avoid extremely short or long hours, will have greater inequality in employment hours.

This article examines the gap in paid work hours among couples across 23 countries using data provided, primarily, by the 2002 International Social Survey Programme (ISSP) and the Organisation for Economic Co-operation and Development (OECD). On average, women worked fewer paid hours than their spouses, but the magnitude of this gap varied by country, ranging from 2 to 20 hours per week. Figure 1 displays considerable cross-national variation in couples' use of time. This article examines how work hours vary among couples and how these correlate with household and national characteristics. At the household level, the occupation of each partner was the primary determinant of the work-hour gap. At the country level, work-hour regulations played a prominent role. This article shows that for each additional allowable work hour, the gap in work hours increased by about 20 minutes per week and was a considerable explanatory variable of gender inequality in paid labour between countries. For example, countries with maximum work hours of 60 per week had an expected 5-hour per week greater gender gap in paid work hours than countries with maximum work hours of 45 per week, ceteris paribus.

Household-level determinants of work hours

Demographic characteristics

Individuals' characteristics play a key role in determining work hours. Of particular importance for married women are level of education and presence of children. Women with higher levels of education are more likely to be in the labour force and to work long

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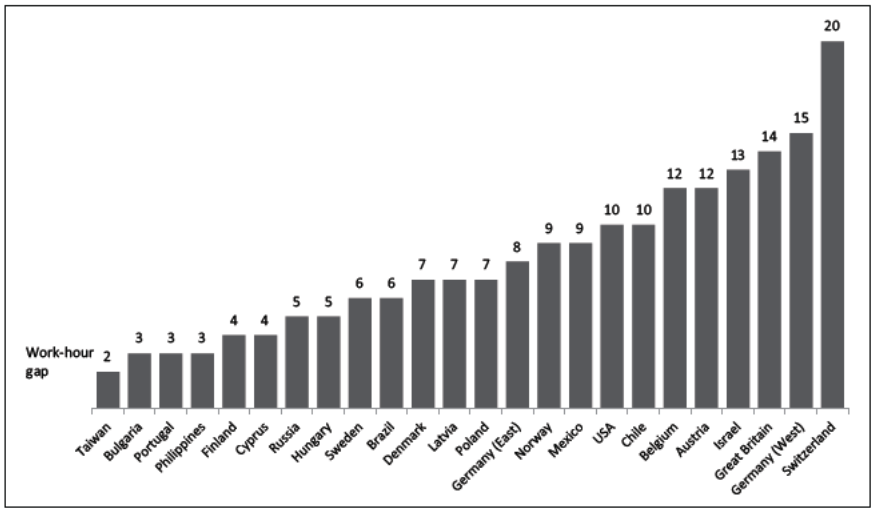

Figure 1. The gap in work hours between dual-earner couples.
Source: ISSP 2002.

hours (Jacobs and Gerson, 2001), in part because they forgo more income if they do not work. Women with children work fewer hours than childless women (OECD, 1998) and the age of a woman's youngest child is the single most important predictor of labour force status (Dex, 2004). Although women's employment has become more continuous, most mothers do not return to their pre-child level of work hours after a birth (Stier and Lewin-Epstein, 2001). One reason is that women are more likely to accommodate their work schedules and hours to family needs than are men (Kaufman and Uhlenberg, 2000).

The division of household labour

Women do more housework than men in all industrialized countries (Batalova and Cohen, 2002). However, there is significant national variation in how egalitarian the distribution of household labour is (Fuwa, 2004). There is also variation based on couple characteristics, with parental status and labour force participation being of particular importance. Parents tend to fall back on 'traditional' gender roles, but are more likely to share the housework if both partners work full time: women who are part-time workers do almost as much housework as stay-at-home mothers (Dex, 2004). Because women are disproportionately in charge of housework, they are less available to work full-time hours than are men. However, working women do cut back on housework hours in response to employment demands.

Job characteristics

Key aspects of jobs influence how much people work: sector of employment, occupation and wage rate. Public sector jobs generally require fewer work hours and have more flexibility

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and part-time options (Plantenga and Remery, 2010) and women are disproportionately in these jobs. Occupation matters because of differing work-hour demands. Certain jobs have long normative hours (e.g. managers, doctors, lawyers) and these patterns are similar across countries (Nicot, 2006).

Chang (2000) argues occupational segregation can reinforce traditional distributions of employment and housework time. Occupational segregation and female concentration in public sector jobs may exacerbate inequality in work hours in so far as female-dominated occupations have shorter normative work hours than male-dominated occupations. Men are more likely to be in managerial occupations and in the private sector; and in these employment positions, they are likely to work more hours than their spouses and to earn more (Kanji, 2013; Kitterød and Rønsen, 2012).

Country-level determinants of work hours

Welfare state

Individuals are affected not only by their own characteristics, but by the overall social structure in which they are embedded. Both household-level characteristics and country characteristics are needed to explain gender inequality (Van der Lippe and Van Dijk, 2002). If only country-level characteristics are examined, cross-national variation in household characteristics is ignored. However, if only household-level characteristics are included, social context is overlooked.

Fuwa (2004) found that women's full-time employment and gender ideology are more effective in obtaining a more equal division of household labour in countries with greater gender parity in wages and political and professional opportunities, independent of their own characteristics. Mandel and Semyonov (2003) found that the income gap is determined not only by women's individual characteristics, but by the welfare state in which women live. In a more developed welfare state, offering substantial childcare coverage and family leave benefits, there is a smaller gender gap in income, even when controlling for individual characteristics.

European comparative studies have relied on Gøsta Esping-Andersen's (1990, 1999) description of the welfare state. Esping-Andersen categorizes countries into groups consisting of Liberal, Conservative and Social Democratic welfare states. The Liberal welfare regime is characterized by weak regulations, lack of family policy and the dominance of the market in providing services. Conservative countries are characterized by familialistic policies. Risk is pooled within the family, male breadwinners are favoured for employment and benefits and the labour market is strongly regulated. Social Democratic countries provide more comprehensive risk coverage and universal benefits, with minimal dependence on the market for social services.

Labour force participation rates approach greater parity in the Social Democratic countries, while Conservative countries have the highest levels of work-hour inequalities between men and women. Employment regulations vary among Liberal countries, with the USA having high levels of full-time female labour force participation with few part-time options, contributing to smaller gaps in work hours. Women in the UK are more likely to work part time than in the USA and in 2003 they expanded their part-time

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employment protections by granting workers with children the right to request reduced hours (Lyonette et al., 2011). In Eastern Europe, there has been a long-standing tradition of dual-earners with few part-time jobs, indicating that if women work, they will do so full time. Wages in Eastern Europe are also lower than in the rest of Europe, which creates a need for women to work (Mósesdóttir, 2000). In spite of recent increases in female labour force participation, Latin American countries lag behind other developed countries, with labour force participation rates ranging from 37 per cent to 57 per cent (compared to rates in Social Democratic countries of 78% to 82%). While employed women show substantial parity with men in terms of hours worked per week, it would be misleading to characterize these countries as having high levels of equality because many women are out of the labour force.

Work-hour regulations

By providing guidelines for national work-hour standards, the European Union (EU) has played a large role in legislation on work hours. The EU first issued working time standards in 1993, followed by the Working Time Directive 2003/88/EC. To keep pace with the changing workforce, the Working Time Directive is currently being updated (European Commission, 2010). Though the goal of these Directives is to provide minimum worker protections, countries vary in the generosity of their benefits and working time provisions. Countries may also deviate from the Directive where collective agreements are in place (Plantenga and Remery, 2010) or take advantage of flexibilities built in for different countries, sectors and types of workers (European Commission, 2010). Countries where overtime premiums are high are more likely to have shorter work hours, while labour markets that are less regulated and where overtime pay is low have fewer workers working long hours (OECD, 1998). The growth of temporary and part-time jobs may be occurring, partially, in response to these dynamics. Recent policies have shifted toward greater firm flexibility and individualization of work hours (Plantenga and Remery, 2010). While some types of flexibility offer workers more schedule control in terms of when and where they work, these measures have not been as successful in reducing the number of hours worked (Lyness et al., 2012). The EU Working Time Directive stipulates a statutory limit on work hours of 48 hours per week, though in practice several countries have normal weekly work hours that fall below that threshold (Plantenga and Remery, 2010). Work-hour regulations have implications for the actual hours people work. Gornick and Meyers (2003) find that lowering standard work hours reduces the number of hours people work.

Family policies

Esping-Andersen (1999) argues that the provision of childcare is crucial to female labour force participation and Gornick and Meyers (2003) report that access to parental leave reduces income inequality between men and women. However, work–family policies can have a segregating effect and goals for gender equality in the labour force are not always compatible with work–family policies. Because parental leave benefits tend to be more generous for mothers than for fathers and women are more likely to use parental leave benefits, this can exacerbate the gender difference in work hours in reflection of

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historical gendered expectations about care work (Ray et al., 2009). Typically, upon the birth of children, women reduce their work hours and men compensate for reduced household income by working additional hours (Jacobs and Gerson, 2001). Leave policies, as currently used, facilitate this redistribution of time.

The aggregation of family policies may mask qualitatively different goals and outcomes and policies may have different effects on work hours. Leave policies are provided to allow parents to spend time with their children and, in some countries, to increase women's job attachment (Waldfogel, 1998). In contrast, childcare services maintain continuity of employment. Countries that provide extensive leave do not necessarily have high rates of childcare enrolment. In fact, childcare and family leave may be competing sources of care that have different effects on the gap in work hours between spouses. If childcare services are available, this allows carers to perform other activities, particularly paid work. Countries with lengthy leave policies may have a more comprehensive family policy (including childcare), or these policies may reflect traditional views towards women's employment, hence providing a long period of time for women to stay home with their children. Fagan and Norman (2012) find that leaves of shorter duration are more conducive to labour force attachment: women are more likely to be continuously employed when their children are young if they return to employment within nine months of childbirth. Hook (2010) finds that long parental leave is associated with greater specialization in paid and unpaid work. Since women make the most use of parental leave, they may establish a pattern early on, whereby they do more housework and childcare and less paid work than do men.

Part-time labour force participation

There is no consensus in the literature as to whether part-time employment opportunities encourage more gender equality in the labour market or hinder equality. On one hand, part-time jobs may facilitate entry to the labour market for women who would otherwise not be employed, or they may provide the option for reduced hours to women who would otherwise leave the labour market. On the other hand, part-time jobs may encourage already employed women to reduce their hours or create a class of jobs that are heavily feminized with fewer opportunities for advancement. Recent EU Directives have expanded protections for part-time work, but even in countries with these protections, there are significant gender gaps in uptake and women's wages in part-time positions suffer (Plantenga and Remery, 2010). In the USA and Latin America, rates of part-time employment are low and these positions offer no significant part-time employment protections (Kalleberg, 2000; United Nations, 2000).

Data

Comparable data are available for 23 countries representing various European, Asian, North American and Latin American countries. Data are obtained from the ISSP's 2002 Family and Changing Gender Roles module. These data are ideal for a cross-national comparison of work hours, because they provide information on respondent and spouse work hours harmonized for 23 countries. This survey includes 34 countries, but some countries are omitted in this article because of missing data on key variables. The

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remaining countries are Austria, Belgium, Brazil, Bulgaria, Chile, Cyprus, Denmark, Finland, Germany, Great Britain, Hungary, Israel, Latvia, Mexico, Norway, Philippines, Poland, Portugal, Russia, Sweden, Switzerland, Taiwan and the USA. The sample was restricted to men and women aged 18 to 65 who reported they were married or 'living as married' and were employed at least 1 hour per week.[1] The total analytical sample was 2682 dual-earner couples. At the macro level, the sample was 24 (23 total countries, but East and West Germany provided data separately).

Dependent variable

Respondents were asked to state the number of hours they worked in an average week, as well as the number of hours their spouse worked in an average week, including overtime. The difference between the husband's and the wife's employment hours is the gap in work hours. Since the ISSP only collected data from one person per household, the respondent reported the spouse's work hours. This may have resulted in some reporting error. The National Survey of Families and Households, with work-hour data collected directly from the respondent as well as the spouse, was used to assess the level of this error. When comparing the respondent's account of his or her spouse's work hours with the spouse's account of his or her own work hours, the margin of error was +/− 3 hours. That is, by using the respondent's account of the spouse's work hours, the actual work hours may have been over- or under-estimated by three hours, although most respondents were within 2 hours. As a robustness check, aggregated work hours were modified by a few hours in each direction and results were not significantly different.

Household-level independent variables

There are three main categories of independent variables: demographic characteristics, division of household labour and job characteristics. Descriptive characteristics are provided in Table 1. Demographic characteristics include education (1 = some college or higher) and the number of children in the household. The presence of children was measured by two variables indicating the number of children ages 0–5 and 6–17 in the home.

The division of household labour was assessed by two variables indicating the total number of housework hours performed by the husband and wife. Job characteristics include employment sector, four-digit occupation and wage rate. Working in the public sector is a binary variable, as are each of the four-digit occupations. The large category 'general manager' was omitted to serve as a reference point. The wage rate was calculated by dividing weekly wages by weekly work hours. Wage rate is the preferred measure over annual earnings to standardize for hours worked.

Because of the importance of occupation to understanding work hours, two supplementary occupation measures were created. First, four-digit occupation was transformed into an ISEI (International Socio-Economic Index of Occupational Status) score using the scale provided by Ganzeboom and Treiman (1996). The ISEI is a composite of socioeconomic indicators (education and income) which are characteristic of a given occupation. The index ranges from 16 to 90, with judges occupying the highest score and farm hands and labourers and helpers and cleaners occupying the lowest score. Second, to

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Table 1. Descriptive statistics for household-level variables.

Variable	Description and coding	*Mean*	*SD*
Work-hour gap	Gap in work hours between couples (in hours per week)	8.35	14.90
M: Work hours	Men's usual weekly work hours	44.37	10.99
F: Work hours	Women's usual weekly work hours	36.02	12.02
Female	Share of sample that is female (female=1)	0.56	0.50
Demographic characteristics			
Children ages 0–5	Average number of children present	0.30	0.62
Children ages 6–17	Average number of children present	0.80	1.02
M: Education	Share with some college education or higher	0.38	0.49
F: Education	Share with some college education or higher	0.40	0.49
Division of household labour			
M: Housework hours	Men's usual weekly housework hours	7.20	8.54
F: Housework hours	Women's usual weekly housework hours	16.55	11.96
Job characteristics			
M: Public sector	Share working in the public sector	0.26	0.44
F: Public sector	Share working in the public sector	0.36	0.48
M: Wage rate	Hourly earnings (weekly wages/weekly hours)	9.21	19.47
F: Wage rate	Hourly earnings (weekly wages/weekly hours)	7.34	16.12
M: ISEI	Range 16–90 (higher number=higher status job)	45.50	17.19
F: ISEI	Range 16–90 (higher number=higher status job)	44.91	16.71
M: Percent unionized	1=less than 20%; 2=20%–49%; 3=50%+	2.18	0.61
F: Percent unionized	1=less than 20%; 2=20%–49%; 3=50%+	2.27	0.60
N: 2682			

(M=men; F=women).
Source: ISSP 2002.

assess whether the effect of occupation stems from being concentrated in occupations that are unionized, 'percent in a unionized occupation' was included in the models. Occupations in which 50 per cent or more workers are union members were considered to have high levels of unionization and were coded 3, occupations that were 20 per cent to 49 per cent unionized were coded as 2, while occupations with low levels of unionization (below 20%) were coded as 1.

Country-level independent variables

Family policy variables include the enrolment of children younger than 3 in childcare services and the combined length of maternity and parental leave offered to parents. Country-level data for childcare enrolment and parental leave were obtained from the OECD. The OECD provided data on childcare enrolment for children between the ages of 0 and 3 and the length of maternity and parental leave offered to parents in each country. Other variations of parental leave were tested (e.g. maternity leave rather than

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Table 2. Descriptive statistics for country-level variables.

Variable	Description	*Mean*	*SD*
Regulations			
Maximum work hours	Maximum allowable work hours per week (range: 45–75)	56	10
Normal work hours	Standard weekly hours beyond which overtime pay would be required (range: 37–50)	42	4
Family policies			
Childcare enrolment	Percentage of children ages 0–3 enrolled (range: 3–64)	21	17
Parental leave	Combined length of maternity and parental leave available in weeks (range: 8–180)	72	61
Labour force participation			
Female part-time labour force participation N: 24	Percentage of women working part-time (range: 4–71)	27	16

Sources: OECD, Eurostat and the ILO.

parental leave and a measure including the percentage of income remunerated during the leave), but none was found to have any significant effect and all were subsequently dropped. Table 2 provides country-level descriptive statistics.

Data on women's part-time labour force participation for the ages 25–54 were obtained from the Eurostat European Union Labour Force Survey and the Current Population Survey. Women's part-time labour force participation was included as a percentage indicating the extent to which women were employed part time.

Data on work-hour regulations by country were provided by the OECD (1998). The International Labour Organization (ILO) archives on country legislation for work hours were used when there was missing OECD data. Variables included normal weekly hours beyond which overtime pay was required and maximum allowable work hours. Because work-hour regulations have changed over time, this article uses the regulations that were in place at the time of the survey data collection. This allows for proper interpretation of the model effects of work-hour regulations and their association with other variables. Work-hour regulations were assessed through two variables: normal weekly hours and maximum weekly hours. Normal weekly hours were hours worked that did not require overtime pay. The only country in the sample that did not have normal weekly hours at the time of the survey was Great Britain and it was top-coded at 50 hours per week. Sensitivity tests were conducted to ensure the selection of 50 hours did not alter the conclusions drawn from the models. Most countries' weekly work hours centred around 40, though the range was from 37 to 50 hours per week. Twenty countries imposed maximum allowable overtime hours, ranging between five and 15 additional weekly hours. Countries having no weekly maximum hours (three countries of the 23) were top-coded at 75 hours.

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To conserve on degrees of freedom, two different variables were included in place of four-digit occupation. The best combination to replace four-digit occupation was the ISEI code and the level of unionization in an occupation.[2] While not offering a complete replacement for the effect of occupation, the two variables combined offered a reasonable trade-off.

Methods

Household-level variables were tested using OLS regression to determine how demographic, household labour and job characteristics correlated with the gap in paid work hours. Country-level variables were also initially tested using OLS regression to establish the combined effect of all country-level variables. The second step was to test a hierarchical model, as such a model allows for nested data. Hierarchical models can test relationships between couples and across countries and can determine the effects of variables at each level and across levels (Raudenbush and Bryk, 2002).

Variables at the household level were included in the models as control variables to avoid biased estimates of country-level effects. The outcome of interest was the gap in work hours at the household level, but the key predictors were country-level predictors. As the study was limited by lack of data points because of the scarcity of complete data for some countries, not all country-level variables could be used simultaneously in a hierarchical model so these were tested in different combinations. First, a base model without any variables was tested and subsequently the household-level variables were added. Then a model testing the effects of regulations (maximum work hours and normal work hours), a model for part-time labour force participation and a model of family policies (childcare enrolment and family leave) were tested. The most significant predictors of each grouping (maximum work hours and childcare enrolment) were tested in a final model. All variables in the model were centred at the grand mean, where the intercept is interpreted as the couple-level gap in employment hours at the average score for household-level and country-level characteristics.

Results

About 57 per cent of the gap in employment hours was due to differences in work hours between spouses, while 43 per cent of the gap was due to unequal labour force participation rates from country to country (Figure 2). This result was calculated by dividing the average gap in work hours among dual-earner couples across all countries (12 hours per week) with the gap of all couples (21 hours per week) which included spouses who were not working. These measures were positively correlated (r=.41), indicating that countries where there was a small work-hour gap between working couples also had a higher proportion of women in the labour force or were more likely to have single-earner households with shorter average work hours. Therefore, it is important to consider whether 'work-hour inequality' encompasses those out of the labour force because of the implications this has for the interpretation of the results. For instance, countries that have a large proportion of women out of the labour force may appear more egalitarian when the non-employed are excluded, if the relatively few that do work are employed full time

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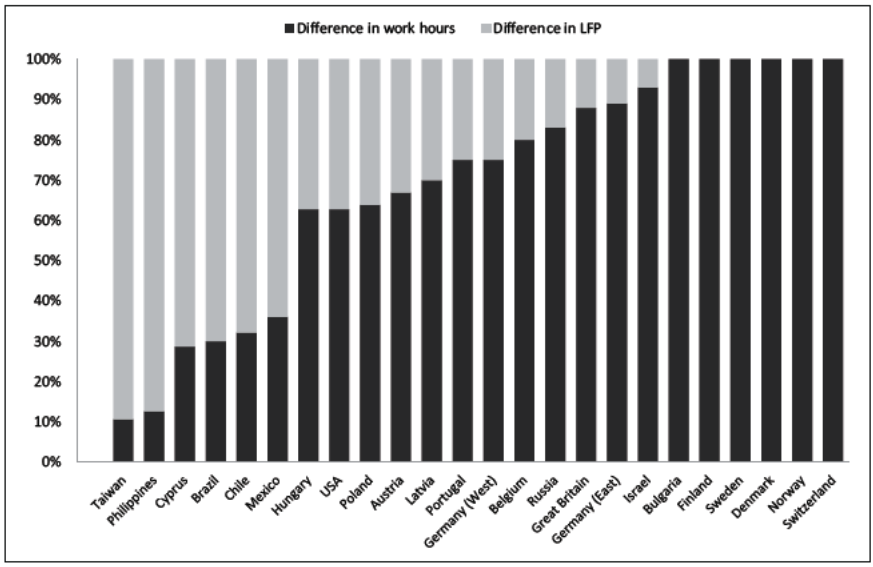

Figure 2. Percent of the gender gap in work hours due to differences in work hours versus inequality in labour force participation.
Source: ISSP 2002.

(Figure 3). The scope of this article is to examine work-hour differences among employed couples. As such, the results shown here explain the above described 57 per cent gap (gap in employment due to differences in work hours between spouses). Additional models including those out of the labour force were also tested and full results are available upon request.

Household-level results

All household-level variables helped explain the gap in work hours, though only occupation explained a considerable amount of variance (Table 3). Number of children increased the gap in work hours and these variables remained significant even when accounting for the division of household labour and job characteristics. Examining the full model (model 3), for each child between the ages of 0 and 5, the gap in work hours increased by about 53 minutes per week (.89 of an hour). Older children increased the gap by about half an hour per week. Women with higher levels of educational attainment worked more similar hours to their spouses, as having a college degree was associated with a 1.4-hour reduction in the gap. However, these demographic characteristics were only able to account for 1 per cent of the variance, thus were not good predictors of the work-hour gap.

The division of household labour was an important factor associated with work hours for both men and women. The gap in paid work hours decreased by about 15 minutes per week per hour of housework contributed by men. The opposite was true for women – the more housework women performed, the greater the gap in work hours. Housework variables explained about 5 per cent of the variance and were also weak predictors.[3]

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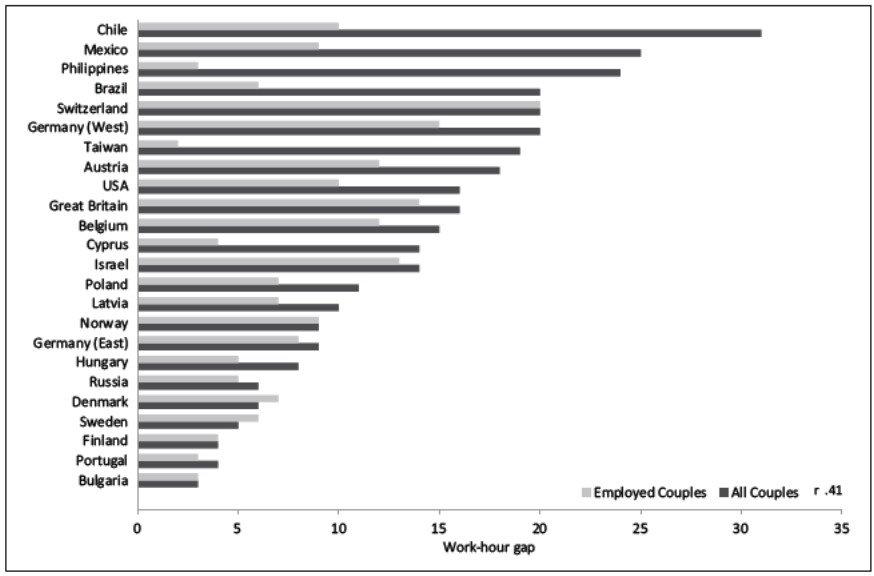

Figure 3. The gap in work hours between all couples and dual-earner couples.
Source: ISSP 2002.

Wage-rate findings were counter to what one might expect: as the wage rate increased for women and decreased for men there was more inequality in work hours. One possible explanation was the correlation between men's and women's wage rate among working couples ($r = .55$, $p = .01$). In this sample, high earning women were married to high earning men. This would make it possible for women to have high wages but still work fewer hours than their husbands who also had high wages and long work hours. Public sector employment among men reduced the gap in work hours by 3.1 hours per week but had no effect among women. For men, participation in the public sector could reduce the gap because public sector occupations tend to have shorter work hours compared to occupations in which men are typically overrepresented.

Most of the explanatory power at the household level came from the inclusion of four-digit occupation in the model. Including the respondent's and spouse's occupation and other job characteristics increased the variance explained to 43 per cent, with most of the increase attributable to occupation. This could be because occupations standardize certain elements of jobs, work hours included. Certain types of occupations may demand a certain number of hours on task that are not negotiable by individuals, but set by employers or occupational norms.

Country-level results

To understand how all the country-level variables operate jointly, OLS regression results are discussed first (Table 4). The model was a very good fit ($r^2=.70$), indicating that these variables explained a remarkable portion of work-hour inequality even without

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Table 3. OLS regression results for household-level determinants of the gap in work hours among dual-earner couples.

	Model 1	Model 2	Model 3
Dependent variable: work-hour gap			
Predicted husband–wife gap in work hours	7.14*** (0.29)	5.59*** (0.40)	7.55*** (1.13)
Demographic characteristics			
Number of children ages 0–5	1.37*** (0.28)	1.36*** (0.28)	0.89* (0.45)
Number of children ages 6–17	0.90*** (0.17)	0.80*** (0.17)	0.46+ (0.27)
M: Higher education	1.19** (0.42)	1.48*** (0.42)	0.92 (0.74)
F: Higher education	–1.66*** (0.41)	–0.92* (0.42)	–1.36+ (0.73)
Division of household labour			
M: Hours of housework		–0.33*** (0.02)	–0.24*** (0.04)
F: Hours of housework		0.22*** (0.02)	0.17*** (0.03)
Job characteristics			
M: Wage rate			–0.09*** (0.02)
F: Wage rate			0.04*** (0.01)
M: Public sector			–3.10*** (0.74)
F: Public sector			–0.31 (0.59)
M: Four-digit occupation			Included[1]
F: Four-digit occupation			Included[1]
r^2	0.01	0.05	0.43
N: 2682			

Notes: Standard errors are in parentheses. + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests).
[1]Models include 4-digit occupation as binary variables with general managers as the omitted reference category. Coefficients for all occupations are available upon request.
Source: ISSP 2002.

household-level data. Couple-level inequality in work hours was associated with high maximum work-hour thresholds. For each additional allowable work hour, the gap in work hours increased by about 20 minutes per week. As an example, Switzerland, with maximum work hours of 64, had an expected work-hour gap that was 6.3 hours per week higher than Finland with maximum work hours of 45 (19 hour difference x 20 minutes per hour = 380 minutes or 6.3 hours). Because it is mostly men who work very long hours, work-hour limits may operate by reducing the number of hours men can work. A reduction in men's hours may also lead women to increase their own work hours to make up for lost household income.

As childcare enrolment increased among young children, the work-hour gap decreased by 9 minutes per week for each additional percentage-point increase in childcare enrolment. So Hungary, with 19 per cent enrolment, had an expected work-hour gap that was 6.8 hours longer per week than Denmark with 64 per cent enrolment. Previous research

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Table 4. Country-level OLS regression results for the gap in work hours.

Dependent variable	Work-hour gap
Predicted country average husband–wife work-hour gap	18.96** (8.84)
Employment regulations	
Maximum work hours	0.21* (0.08)
Normal work hours	–0.61* (0.24)
Family policies and benefits	
Childcare enrolment ages 0–3	–0.15** (0.04)
Parental leave	–0.01 (0.01)
Labour force participation	
Female part-time labour force participation rate	0.29*** (0.06)
r^2	0.70
N	24 (East and West Germany analysed separately)

Note: Standard errors are in parentheses. + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests).
Sources: OECD, Eurostat and the ILO.

shows that childcare is positively associated with female labour force participation and work hours. This article goes further in showing that it not only affects women's labour force participation and increases their individual work hours, but that it diminishes gender inequality in work-hour distributions within households.

Examining female part-time labour force participation answers an important question: do part-time jobs lead to more or less equality in labour supply? As might be expected, the results indicate that part-time jobs increased inequality among the working couple population. That is, part-time jobs were positively associated with inequality in working hours when considering only those employed. What is interesting to note is that when the sample was expanded to include those not in the labour force, part-time jobs did not reduce overall work-hour inequality as might be expected if part-time work drew women into the labour force. When the sample included those out of the labour force, the effect of part-time work on work-hour inequality disappeared, rather than becoming negatively correlated with inequality in working hours.[4]

Turning to the hierarchical models (Table 5), household-level variables explained 21 per cent of the between country variance and 18 per cent of the between household variance. However, country-level variables emerged as much more significant explanatory factors. The regulation variables reduced between country variance by 66 per cent. The combination of maximum work hours and part-time labour force participation yielded 98 per cent of the between country variance while childcare and maximum work hours

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Table 5. Hierarchical linear model results for household-level and country-level determinants of the gap in work hours among dual-earner couples.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Predicted husband–wife gap in work hours	9.13*** (0.98)	8.36*** (1.11)	8.78*** (0.83)	8.32*** (1.18)	9.48*** (0.48)	8.92*** (0.89)
Household-level variables						
Children 0–5		1.54* (0.71)	1.57* (0.70)	1.53* (0.71)	1.56* (0.70)	1.54* (0.71)
Children 6–17		–0.07 (0.38)	–0.08 (0.37)	–0.06 (0.38)	–0.05 (0.36)	–0.06 (0.37)
M: Higher education		–0.98 (0.96)	–1.07 (0.96)	–1.00 (0.96)	–0.63 (0.94)	–1.11 (0.96)
F: Higher education		0.19 (1.00)	0.35 (1.00)	0.17 (1.01)	0.53 (0.97)	0.18 (1.00)
M: Hours of housework		–0.26*** (0.05)	–0.26*** (0.05)	–0.26*** (0.05)	–0.24*** (0.05)	–0.26*** (0.05)
F: Hours of housework		0.22*** (0.04)	0.21*** (0.04)	0.22*** (0.04)	0.22*** (0.04)	0.22*** (0.04)
M: Wage rate		–0.10*** (0.02)	–0.09*** (0.02)	–0.10*** (0.02)	–0.10*** (0.02)	–0.10*** (0.02)
F: Wage rate		0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
M: Public sector		–2.79*** (0.82)	–2.76*** (0.82)	–2.77*** (0.82)	–2.55*** (0.80)	–2.71*** (0.82)
F: Public sector		0.42 (0.76)	0.42 (0.76)	0.41 (0.77)	0.38 (0.75)	0.39 (0.76)
M: ISEI code		0.13*** (0.03)	0.13*** (0.03)	0.13*** (0.03)	0.12*** (0.03)	0.13*** (0.03)
F: ISEI code		–0.05+ (0.03)	–0.06* (0.03)	–0.06* (0.03)	–0.06* (0.03)	–0.06* (0.03)
M: Unionized occupation		–2.08* (0.95)	–2.19* (0.95)	–2.07* (0.95)	–2.41** (0.94)	–2.10* (0.95)
F: Unionized occupation		0.50 (0.94)	0.58 (0.94)	0.49 (0.94)	0.58 (0.93)	0.59 (0.94)

(Continued)

Table 5. (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Country-level variables						
Maximum work hours			0.25* (0.12)		0.27*** (0.05)	0.35** (0.11)
Normal work hours			0.47 (0.27)			
Childcare enrolment: ages 0–3				0.05 (0.06)		0.03 (0.05)
Parental leave: total weeks				–0.00 (0.02)		
Female part-time labour force participation rate					0.22*** (0.04)	
Variance components						
Intercept	21.15***	16.71***	7.27***	18.87***	0.52	9.10***
Level 1	187.24	153.25	153.27	153.24	153.45	153.27
N	24	24	19	19	19	19

Note: Standard errors are in parentheses. + $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests).
Sources: ISSP 2002, OECD, Eurostat and the ILO.

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explained 57 per cent of the between country variance. Family policy variables were weakest and did not contribute to the explanation of the gap in work hours.

Country-level predictors remained stable and significant even after controlling for household-level variables. Maximum work hours remained highly significant and positively correlated with inequality in work hours. Similar to the OLS models, these models show that for every additional allowable overtime hour, the gap in paid work hours increased by up to 21 minutes (model 6 = 0.35 of an hour). As in the OLS models, female part-time labour force participation was only significant among working couples and the effect was to increase inequality in employment hours. For every percentage increase in part-time labour force participation, the gap in work hours increased by about 13 minutes per week (model 5 = .22 of an hour). Childcare no longer reached statistical significance when controlling for household-level variables.

There were some changes among household-level variables after controlling for country-level variables. Among working couples, education, female wage rate and older children were no longer significant. Occupational variables remained significant. Work-hour inequality increased as men's occupational status increased, while men's presence in unionized occupations decreased the work-hour gap. Among women, higher occupational status was correlated with a smaller gap in work hours. The presence of young children and unequal distributions of housework contributed to a less equitable distribution of employment hours, while men's lower wages and higher levels of public sector participation were associated with more equality in work hours.

To summarize, country-level characteristics are essential to understanding gender work-hour inequality between couples. When maximum allowable work hours were shorter, work-hour inequality between spouses decreased. Part-time labour force participation, as expected, increased inequality in working hours among those who were employed, while having no effect when including those out of the labour force. Family policy variables did not reach statistical significance.

Conclusion

This article shows that two main factors explain the gap in employment hours among couples: labour force participation rates and social structural conditions. Approximately 57 per cent of the gap is due to inequalities in actual hours worked once women are employed while the remaining 43 per cent of the gap in work hours is due to women working zero hours, that is, being out of the labour force. This pattern varies significantly by country. Countries in which labour force participation among women has lagged (Conservative and Latin American countries) or countries that have faced reductions in labour force participation due to economic transitions (Eastern Europe) are where labour force participation matters more than work-hour differences. This is because of a strong dichotomization of the labour force, where women are either out of the labour force or work full-time. If labour force participation rates among women continue to rise, inequality among employed women's working hours will be of even more importance.

Household-level characteristics do affect work-hour inequalities between spouses; however, the main effect is through occupation. In spite of previous research positing the importance of the presence of children, human capital and the division of household

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labour, these factors combined only explain between 1 per cent and 5 per cent of the variance in the work-hour gap. In contrast, occupation captures 43 per cent of the variance. Because men and women are segregated into different occupations with different working hours, a promising avenue for future research would be to explore the impact of occupational segregation on the gap in work hours.

Among those employed, social-structural conditions significantly predict work-hour inequality. Countries in which work hours are more strictly limited are the ones in which there is the least gender difference in employment hours. Even when excluding household-level variables, country characteristics such as family policies, work-hour regulations and labour force participation rates can explain up to 70 per cent of the variance in the gap in working hours. Most salient among these variables is the extent to which country policies regulate work hours.

Because of the significance of maximum work-hour regulations, EU initiatives on work hours have strong effects on the gendered work-hour gap across countries. With greater standardization of work hours, there may be less differentiation across countries in working hours. The EU has already shown movement in this direction by establishing Directives on working hours. However, the growing presence of short-hour jobs in some countries may counteract the effect of maximum thresholds on labour contributions, as may any growth in the informal and unregulated economy. As there is no legal 'bottom' threshold for work hours, individuals can decrease their work hours in ways that cannot be regulated.

Researchers have focused on a variety of factors that are causes and correlates of gender differences in the household and labour market: changing belief systems to more egalitarian ideologies, advances in equality in educational attainment and organizational change promoting more equal participation of men and women (Blau et al., 2006). There is also substantial research on the effects of legal interventions such as equal rights, comparable worth policies and family services provision. In fact, the provision of family leave and childcare services is promoted in the Scandinavian countries with gender equality as an explicit goal. These country provisions have obvious implications for gender equality. Yet there are mechanisms that contribute to gender equality that are less obvious. Work-hour regulation is one such measure.

Work-hour flexibility and shorter working hours are promoted as work–family reconciliation measures, but the implications for gender equality have gone relatively unnoticed. One common finding posited as a barrier to gender equality is the asymmetrical rate of change between men and women. Women are more apt to reduce housework hours than men are to increase their housework contributions, women enter male-dominated occupations at higher rates than men enter female-dominated occupations and women have increased their labour force participation more than men have increased domestic labour contributions (Blau et al., 2006). In contrast to these patterns which show behaviour changes mostly among women, work-hour regulations, while gender neutral in legislation, have a strongly gendered effect. It is mostly men who are affected by work-hour limits and it is one way in which change, primarily among men, could bring about more gender equality.

Countries differ in how strictly work hours are regulated, how segregated men and women are occupationally and in the kinds of family policy provided. Because institutional

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constraints on the allocation of paid labour are significant factors in explaining work-hour differentiation, country differences in these attributes will lead to different 'gap' outcomes. Countries with stricter limits on the number of hours that can be worked per week have more effectively addressed household inequality in paid work hours, though the goals have often been stated as solutions to the work–family crunch experienced by dual-earner families and those with caring obligations. Sometimes work–family reconciliation measures are in conflict with goals for gender equality. This is not the case here. Work-hour regulations improve the compatibility of work and family, as well as reduce gender inequality in working hours.

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Notes

1. Marital status was asked and coded in different ways. Most countries coded 'married, or living as married' as 'married'. Denmark asked for 'legal marriage status'. The Philippines only specified 'married', while Sweden counted individuals 'living as married' as single. The survey does not ask for spouses' sex, so it is not possible to evaluate how many households consist of same-sex couples. Only Norway classified 'registered partnership between people of the same sex' as 'married'. Throughout this article, references to 'husbands' and 'wives' are minimized, but when used may also include a limited number of cohabiters and same-sex couples.
2. Percent female in the occupation as well as skill level (as assessed by the ILO) were also tested. Results were broadly similar.
3. Separate models included a gender ideology index. Gender ideology failed to reach statistical significance. These data were ultimately excluded because data were only available for one partner.
4. The effect of part-time labour force participation dropped from 0.29*** to 0.03. Results available upon request.

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Appendix 1: list of abbreviations

EU European Union
ILO International Labour Organisation
ISEI International Socio-Economic Index of Occupational Status
ISSP International Social Survey Programme
OECD Organisation for Economic Co-operation and Development

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Investing in the Care Economy

A gender analysis of employment stimulus in seven OECD countries

March 2016

ITUC CSI IGB International Trade Union Confederation

A report by the UK Women's Budget Group

Commissioned by the International Trade Union Confederation

Written by Jerome De Henau, Susan Himmelweit, Zofia Łapniewska and Diane Perrons[1]

1 Special thanks to Ruth Pearson and Marcia Beer from the Women's Budget Group for their help in editing the report. Contact: Jerome De Henau, The Open University, Walton Hall, MK7 6AA, j.de-henau@open.ac.uk. The content of the report is the authors' sole responsibility and doesn't necessarily reflect ITUC views.

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Cover: AP

Executive summary

Increasing public investment would stimulate employment and economic growth and provide a more effective means of moving out of recession than current austerity policies.

This report makes such a case for public investment that is in social as well as physical infrastructure. By social infrastructure we mean education, care and health services and more specifically for this report, social care activities, that is care for the elderly and disabled and for pre-school aged children. This notion of the social infrastructure includes the labour force that provides care services and its skills, as well as the buildings and facilities in which they work. By physical infrastructure we are referring to the construction sector and activities such as building housing, roads and railways, as this is the more usual outlet for the public investment called upon in times of recession in order to generate employment.

The case for public investment in times of high unemployment and pervasive underemployment derives from Keynesian macroeconomic theory. The central argument is that unemployment and underemployment are due to a **lack of effective demand in the economy** and this lack of demand deters private investment, as there is no market for the products. The government should therefore fill this gap and invest directly in the economy to boost employment and aid economic recovery. Such investment would not only ensure resources, including labour, are fully employed; it should also lead to increased productivity and higher growth rates.

Public investment will create jobs directly in the activities where the investment takes place (for example, in building houses or providing childcare services). But there will also be knock-on or **'multiplier' effects** on other sectors as jobs will be created in the industries that supply the necessary raw materials and services for the initial investment (known as the indirect employment effect). In addition the expansion of employment created by these jobs will lead to an expansion in household income, so new demand is created for a whole range of goods and services that enter household consumption, such as food, clothing, housing, care services and entertainment (known as the induced employment effect). In short, the injection of demand into the economy by government investment will generate employment directly and indirectly and have an expansionary impact on overall demand. In this way such public investment will expand demand and help lift economies out of recession.

The advantage of this strategy is that in time the initial investment should generate benefits worth far more to society than it costs and therefore could justify increased public deficit and borrowing in the initial phase. There will be savings in public expenditure from the reduction in unemployment and social security payments that otherwise would have to be made; the newly employed people will pay tax and in the longer term there will be returns from the investments themselves. In the example given of bridges and care services, these returns would arise from shorter journey times and a healthier more productive population.[1]

Conventionally, governments adopting a public investment strategy have invested in physical infrastructure, such as roads and bridges, as they increase the wealth of society as a whole and generate benefits that accrue over time. In this report we show that there are similar, albeit more gender equal, gains to be made by investing in social infrastructure, and specifically the caring industries. Investing in education and childcare similarly benefits society as a whole and these benefits are generated over time as 'better educated and cared for children grow into more productive happier adults. For these reasons we refer to investment in the caring industries as investment in social infrastructure' (Himmelweit, forthcoming).

In this report we present the theoretical arguments, evidence from case studies and findings from our own empirical research on the employment effects for men and women of investing in social infrastructure. We make the case for public investment at times of low growth, high unemployment and pervasive underemployment. We highlight the significance of investing in the caring infrastructure, as well as in physical infrastructure; review the growing body of supporting research evidence and provide new empirical findings from our seven - country analysis (of Australia, Denmark, Germany, Italy, Japan, UK and US) which estimates the employment impact of increased public investment in the construction and care industries.

Our analysis shows that investing in either the construction or care industries would generate substantial increases in employment. If 2% of GDP was invested in the care industry, and there was sufficient spare capacity for that increased investment to be met without transforming the industry or the supply of labour to other industries, increases in overall employment ranging from 2.4% to 6.1% would be generated depending on the country. This would mean that nearly 13 million new jobs would be

1 This strategy, as Paul Krugman (2015) notes, is the textbook Keynesian response to recession and indeed has been followed by many governments in the past and was the initial response by the G20 in response to the 2008 crisis, though less evident in the European Union's Stability and Growth Pact or in the UKs continued pursuit of austerity, both of which are influenced by neoliberal economic thinking.

created in the US, 3.5 million in Japan, nearly 2 million in Germany, 1.5 million in the UK, 1 million in Italy, 600,000 in Australia and nearly 120,000 in Denmark. As a consequence the employment rate of women would increase by 3.3 to 8.2 percentage points (and by 1.4 to 4.0 percentage points for men) and the gender gap in employment would be reduced (by between half in the US and 10% in Japan and Italy), the precise amounts depending on specific country characteristics. A similar level of investment in the construction industries would also generate new jobs, but approximately only half as many and would increase rather than decrease the gender gap in employment (see Tables 13, 14 and 15).

Besides creating new jobs, investment in both childcare and social care would help tackle some of the central economic and social problems confronting contemporary societies: low productivity, the care deficit, demographic changes and continuing gender inequality in paid and unpaid work.

Our findings show that governments seeking to expand employment would do well to increase public investment in the economy and that there are strong arguments for more of this investment being in the caring infrastructure than is currently the case. Investment in the care industry, in addition to creating a higher number of jobs, would also address the care deficit and reduce gender inequality. Such a policy would contribute towards creating a more inclusive model of development as well as lifting economies out of recession.

Introduction

Increasing public investment would boost employment and economic growth and provide a more effective means of moving out of recession than current austerity policies.

In this report we make such a case for public investment that is in social as well as physical infrastructure. By investment in social infrastructure we mean investment in education, health and social care services. Physical infrastructure refers to the construction sector and activities such as building housing, roads and railways and has been the more usual outlet for the public investment called upon in times of recession and high unemployment.

We begin by reviewing the theoretical arguments for increased public investment, and specifically investment in social infrastructure, in the context of low economic growth, high unemployment and enduring gender inequality. We consider the broader case for investment in social infrastructure in terms of narrowing the gender employment gap and contributing to resolving the care deficit identified in most OECD countries. We then review a number of studies which have identified positive impacts from investment in social infrastructure before presenting the findings from our own analysis.

Our empirical investigation is of seven high-income OECD countries: Australia, Denmark, Germany, Italy, Japan, UK and US, chosen to reflect different regions of the world, different systems of economic and social regulation and because of data availability. We develop a quantitative tool using input-output tables and official statistics to estimate the direct and indirect employment effects of an increase of public investment in both the construction sector and the care industries (child and social care) as examples of physical and social infrastructure respectively. Our findings show that both forms of investment would generate new jobs, while investment in the care industries would generate approximately twice as many jobs as investment in the construction sector.

More specifically, if 2% of GDP were invested in caring industries, we estimate that it would generate increases in overall employment ranging from 2.4% to 6.1% depending on the country. Nearly 13 million jobs would be created in the US, 3.5 million in Japan; between nearly 1 million in Italy to just over 2 million in Germany, and 1.5 million in the UK; 600,000 in Australia and nearly 120,000 in Denmark.

We estimate that the majority of jobs created would be taken up by women (between 59% and 70% across the countries studied), reflecting in part the current concentration of women in the care industries. However, because of the impact of the multiplier effect, many of the jobs created would be outside the care sector, and so investment in the care industries would lead to increases in jobs for men as well as for women. We find that the employment rate of women would increase by between 3.3 and 8.2 percentage points and that of men by between 1.4 and 4.0 percentage points, so that the overall gender gap in employment would be reduced by between 1.6 and 4.2 percentage points, depending on the labour market characteristics of specific countries.

We conclude that countries seeking to boost employment could invest in social infrastructure, exemplified by social care services (which tend in political discourse to be neglected as a form of social investment compared to health or education), as well as in traditional forms of physical infrastructure. Such investment would also contribute towards greater gender equality by reducing employment gaps, improving working conditions in the care sector and increasing the options for informal carers to juggle paid work and caring.

> **"The boom, not the slump is the right time for austerity at the Treasury"**
>
> John Maynard Keynes (1937: 390)

The Economic Rationale for Public Investment in Contemporary Times

Background

Contemporary economies are emerging slowly and unevenly from the financial crisis of 2008 and the deepest recession ever recorded. To prevent overall economic collapse the G20 countries initially coordinated an expansionary response which first made money available to rescue the banks and later tried to sustain their lending activities via quantitative easing in the hope that this would stimulate the private sector. In addition there was some public investment in physical infrastructure, that is, in the construction industries for building new roads and bridges, to promote increases in employment and, especially in male employment, which initially suffered more from the recession. No attention was paid to the social or gender impact of this strategy, for example, to how particular social groups were likely to be affected by the support for banks. In the European Union's Economic Recovery Plan, for example, no mention was made of its potential gender impact, even though gender mainstreaming remains official EU policy (Bettio et al., 2012).

By 2010 there were a few small signs of recovery. However, governments became concerned about the high level of government spending and size of the sovereign debt. From 2010 onwards many governments across the globe simultaneously, though without coordination, embarked on austerity policies in an attempt to reduce the size of their public sector deficit and debt. This reduction was seen as a matter of economic survival and little attention was given to the negative impacts on economic growth and employment, to how different social groups were affected or to impacts on gender, or any other type of, equality.

Subsequently, the severity of austerity policies has varied between countries. In the US the government has continued to invest in physical infrastructure during this period and the reduction in economic growth has been less pronounced than in the UK, for example, but cuts were made elsewhere, especially in social spending (Seguino, 2015). The UK government has continued to stress austerity and the need to eliminate the public sector deficit and debt, though between 2012 and 2014 pursued a balanced rather than contractionary budget policy. It hoped to stimulate the economy by reducing the personal income and business taxes and boosting the housing market, but financed these through cuts in government services and social security payments. This strategy has yet to prove successful and has had highly regressive distributional consequences with especially negative impacts for women pensioners and lone parents (WBG, 2015; Krugman, 2015; De Agostini et al., 2015).

The public sector cutbacks have had particularly negative implications for women because in many countries, women are more likely than men to work in the public sector, more likely to be the users of government services and more likely to be the ones who have to fill the gap when the services are withdrawn, described by the UK Fawcett Society as the triple jeopardy. In Europe foreign-born

women and in the US 'women of color' were the ones who were worst affected (Seguino, 2015). Analyses carried out by the House of Commons library and the Women's Budget Group in the UK show that the impact of cuts in public expenditure and social security have fallen mainly on women; in the Conservative Party Summer 2015 budget the proportion paid for by women was estimated to be as much as 78.9% (House of Commons Library Research Findings, 2015).

This reversal of policy from public sector support for the economy and expansionary policies to austerity was justified in part by two academic papers. One (Reinart and Rogoff, 2010) predicted a dramatic decline in economic growth if public debt exceeded 90% of GDP, while a second paper (Rosnik and Baker, 2012) maintained that if the public deficit and debt were reduced there would be a significant increase in business 'confidence' that would generate new investment and greater growth — an idea that became known as (the oxymoronic) 'expansionary fiscal contraction'. However, these academic papers were subsequently shown to contain very basic flaws (Krugman, 2013; Herndon et al., 2014). In addition, the IMF recognised that they had underestimated the highly negative impact of reductions in public expenditure on the economy (Blanchard and Leigh, 2013). Some policymakers then began to rethink and pay more attention to alternative policies that advocate state investment expenditure at times of low growth.[2]

Contrasting economic theories: the case for public investment in place of quantitative aasing or tax cuts

There are two contrasting approaches to try and stimulate economies in conditions of recession, low growth and high unemployment: on the one hand quantitative easing – a form of monetary policy and on the other hand direct public investment in the economy – a form of fiscal policy.

Quantitative Easing — Monetary Policy

The current policies pursued by many countries focus on deficit and debt reduction aimed at keeping interest rates low to restore the confidence of private investors. They are associated with neoliberalism; which stresses the efficacy of liberalisation, self-regulating markets and balanced budgets and insists that problems in economic functioning are to be sought in the state rather than in the market, in particular that the state is too large and inefficient.

Hence fiscal policy is oriented towards the reduction of state expenditure (which otherwise would crowd out private investment) and the reduction of the tax burden on individuals and firms in order to put more 'money in people's pockets' and allow firms to keep more of their profits for investment. However, tax reductions have to be offset by cuts elsewhere in order to maintain the deficit under control. So the tax cuts are matched by cuts in public services and social security payments, thereby withdrawing money from people's pockets and leading to the negative distributional and gendered consequences outlined above.[3]

In this context, the only way that monetary policy can be used to stimulate investment when interest rates are already low is through quantitative easing. Effectively the government prints money and releases funds to the banks (by buying their bonds) with the intention of stimulating bank lending and boosting private sector investment.

To date neither quantitative easing nor tax cuts have proved to be very successful. Private sector investors need to know that their products will be sold and for this they need effective demand (that is demand for products that is matched by the ability to pay for them). People benefiting from reduced taxes may face other constraints and uncertainties that inhibit their willingness to spend more (job insecurity, loss of public services that enable them to take jobs, etc.). So people and firms have in practice used their additional funds for saving or to pay off existing debts, and may have needed to replace public services being cut by providing additional unpaid work and hence reducing their earnings, none of which helps promote economic growth or employment.

Direct Public Investment – Fiscal Policy

This second approach underpins the perspective analysed in this report. The case for public investment at times of high unemployment and low growth derives from Keynesian macroeconomic theory. The central argument is that low growth and high unemployment are due to a lack of effective demand in the economy and this deters private investment. The government should therefore fill this gap and invest directly in the economy to boost employment and aid economic recovery, which could be achieved without stoking inflation provided there is spare capacity in the economy.

Public investment will create jobs directly in the activity where the investment takes place (for example, in building a bridge or providing care services) but in addition there will be a knock on or 'multiplier' effect on other sectors. Jobs will also be created in the industries that supply the necessary raw materials and intermediate services for the investment. Such demand and employment effects will ripple down the supply chain, generating indirect employment in many industries (including within the industry/ies in which the original investment was made). These are known as the indirect employment effects, and they multiply the direct employment effect of the original investment so that the overall degree of employment generation from any increase in investment will be larger than the immediate or direct effect of the initial investment project.

2 European Union Countries are bound by the Stability and Growth Pact which limits the public sector deficit to no more than 3% and public debt no greater than 60% of GDP. By 2014, twelve member states were still above the deficit guidelines and 18 above those for debt. Eurostat (2015) Statistics Explained. Available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Public_balance_and_general_government_debt,_2011%E2%80%9314_(%C2%B9)_(%25_of_GDP)_YB15_II.png. Interestingly the countries that meet the debt requirements are all new member states.

3 In the UK both the Coalition government 2010-15 and new Conservative governments have simultaneously cut personal income tax and reduced public sector services and social security payments – policies whose gender effects are documented by the Women's Budget Group see e.g., WBG 2013 Budget Report at: http://wbg.org.uk/2013-a-budget-for-inequality-and-recession/

In addition the expansion of employment created by these jobs will lead to an expansion in household income, so new demand is created for a whole range of goods and services such as food, clothing, caring services and leisure that enter household consumption which will generate further employment (known as the induced employment effect). Through direct, indirect and induced employment effects, the injection of demand into the economy by government investment will generate employment and have an expansionary impact on overall demand and so help lift the economy out of recession.

In time the initial investment should generate benefits worth far more to society than it costs as a consequence of the demand generated elsewhere in the economy. There will be savings in public expenditure from the reduction in unemployment or social security payments that otherwise would have to be made; the newly employed people will pay tax and in the longer term there will be returns from the investments themselves. In the examples given of bridges or care services, these returns would arise from shorter journey times or a healthier more productive population. If there are concerns that these returns will take too long to materialise and that the immediate impact of government investment will be to increase the deficit and debt by too great an amount, then a government - sponsored investment bank could be set up to directly encourage private investment.[4]

These arguments are not new but date back to the 1930s when John Maynard Keynes offered a solution to the 1930s recession. Keynes is renowned for saying that the kind of public investment does not matter. He argued that even if people were employed to dig holes and then to fill them it would have a beneficial effect on the economy as a consequence of the multiplier effects as explained above. Specifically Keynes argued that:

> *"If the Treasury were to fill old bottles with banknotes, bury them at suitable depths in disused coalmines which are then filled up to the surface with town rubbish, and leave it to private enterprise on well-tried principles of laissez-faire to dig the notes up again (the right to do so being obtained, of course, by tendering for leases of the note-bearing territory), there need be no more unemployment and, with the help of the repercussions, the real income of the community, and its capital wealth also, would probably become a good deal greater than it actually is. It would, indeed, be more sensible to build houses and the like; but if there are political and practical difficulties in the way of this, the above would be better than nothing." (Keynes, 2007/1936: 129)*

More recently in a similar vein Robert Skidelsky and Felix Martin point out that

> *In the short run, it doesn't matter whether the increase in aggregate demand takes the form of employing people to dig holes and fill them up again, giving every household a time-limited spending voucher or building a new railway. All that matters is that the overall level of spending in the economy is maintained – so that unemployment stops rising and with any luck, begins to fall again. But from any long term point of view, increasing aggregate demand by capital investment is better, because it creates identifiable future assets that promise to fund themselves and improve growth potential. (Skidelsky and Martin, 2012)*

Capital investment could therefore take place in infrastructure projects that generate benefits to society as a whole as well as for their direct users, and these benefits will be enduring so the projects will generate positive benefits into the future.

Gender bias in economic thinking

The idea that public investment should fund projects with enduring and widespread benefits is reflected in regulations set by states or by the European Union that limit the permissible levels of debt and deficit, but allow these limits to be exceeded if the expenditure is for capital investment rather than current expenditure. The distinction between the two types of expenditure is made in the System of National Accounts. The first counts as capital stock, whereas the second is considered as government annual current spending, part of GDP. This distinction reflects a gender bias in economic thinking and accounting. While investment in physical infrastructure such as in building bridges, schools, hospitals or nurseries would be permitted and this would therefore include the wages of the builders, the funding for running the schools, hospitals and nurseries, and so the wages of teachers, nurses and childcare workers, would not. The SNA classification fails to recognise the long-term productive contribution of the social infrastructure that employment in the teaching and caring industries builds, through creating and maintaining the stock of "human capital".

Everyone gains from having a better educated, healthier and better cared for population and society, and the economy will continue to benefit from today's spending on health education and childcare well into the future. For these reasons we term this form of expenditure investment in social infrastructure. Governments began to recognise, from the mid-2000s, that spending on education and health could be seen as social investment because it improves the productive capacity of the economy, but they did not consider changing the accounting rules that would allow such expenditure to be counted as capital spending. Nor, indeed, did they see social care services in the same way, especially care for the elderly, where the link between spending and (re)building productive

4 Robert Skidelsky and Felix Martin (2012) suggest government sponsored banks along the lines of the European Investment Bank, the Nordic Investment Bank or the German Kreditanstalt für Wiederaufbau. The difference between this strategy and quantitative easing is that the funds would all be spent (and on approved projects).

capacity is less obvious than in the case of education.[5] Moreover this form of expenditure is rarely considered as a suitable form of investment when policy makers are looking for effective forms of employment generation in recessionary times. In fact the opposite has happened and public expenditure on education, health, childcare and social care services has been cut in many countries as part of their deficit reduction strategies, though the extent of these cuts varies between countries.

This neglect of social infrastructure projects reflects a gender bias in economic thinking and may derive from the gender division of labour and gender employment segregation, with women being over represented in caring work, and men over represented in construction. Investment in social infrastructure is more likely to generate jobs for women while jobs generated by investment in physical infrastructure go largely to men. Male unemployment is often seen to be a more urgent problem as men are assumed to be breadwinners, despite the fact that increasingly many multiple or dual person households rely on more than one income. However, many governments are committed to gender equality and in some cases have a legal duty to reduce gender inequalities. It is therefore incumbent on them to ensure that if employment generation projects are to include some that generate more jobs for men than women, they must at the very least counterbalance these by other projects that generate more jobs for women than for men. Otherwise the gender employment gap will increase.

There is also an efficiency argument for investing in social infrastructure in addition to physical infrastructure as an employment stimulus tool. Our empirical analysis shows for a similar amount of investment in the caring industries and in the construction industries more jobs, even on a full time equivalent measure, are created overall – and the gender gap in employment reduced, not increased – by investing in the caring industries.

Before proceeding to our own findings, we briefly outline the wider case for investing in social infrastructure, as well as present the findings from other studies which also show the relative value of investment in social infrastructure.

Economic and social contributions of caring industries

Public investment in social infrastructure makes economic sense, as it not only generates employment, but also contributes to gender equality and human development (Antonopoulos and Kim, 2011).

The provision of collectivised care services, child and elder care, not only directly creates jobs in the care industry, it also frees others to take on other jobs. This is because collectivised modes of care provision, either in nurseries or elder care homes, and even organised services provided in individual homes, are generally more productive than individualised care within the family. In particular, collective care provision enables a greater labour market participation of women, who in its absence are likely to be the ones caring at home.

Public investment in caring also contributes to resolving the care deficit that arises because more women are in paid employment than ever before but men have not increased the amount of domestic work or caring they do sufficiently to make up the difference. Moreover, because of greater mobility, families are living further apart geographically, so that relying on grandparents to look after their grandchildren or adult children to care for their elderly parents intensively has become increasingly difficult.

Further, provided it is properly funded and regulated, public provision also contributes to the well-being of children by increasing their learning opportunities and social development and integration.

Women are more likely than men to take up jobs created in care services because of continuing industrial and occupational segregation. They are also more likely to be prepared to take employment of any type once high quality and affordable care services are available to reduce the unpaid care responsibilities that remain one of the main constraints to women's greater participation in paid employment. The extent to which investment in care services eventually reduces gender segregation will depend on the extent to which men are incentivised to take up jobs in the care sector, which improved wage conditions might encourage. In any case the initial effect of investing in social infrastructure would contribute to narrowing the gender employment gap and the gender gap in time devoted to unpaid care.

Potentially public provision of care would also narrow social divisions by enabling low-earning women to enter the workforce or increase their working hours and thus their incomes. Without such provision low - paid women are deterred by the high costs of private care provision that higher earning women may be able to afford (Esping-Andersen, 2009). Resulting increases in women's lifetime earnings and pension entitlements would reduce the gender gap in poverty rates, another contribution towards narrowing gendered economic inequalities. Public provision of high quality childcare can also narrow social divisions if they result in children from different backgrounds being cared for together.

These arguments have been made by feminist economists (Elson et al., 2013), organisations such as the Women's Budget Group in their Feminist F plan for recovery and supporters of the Purple Economy (Ilkkaracan, 2013), who also recognise that society depends on care as 'an indispensable component of human well-being' (ibid., p.32) so the public provision of social infrastructure is crucial for economic development.

5 However, a long-term care system could be seen as a contract between generations and an insurance system for the population as a whole to cover any care needs they might have in the future. Paying for such a system would then be an investment in the well-being of the whole population, who would be able to get on with contributing to society in other ways, reassured that their own and their own and their relatives' care needs will be well provided for.

Gender sensitive socially inclusive macroeconomic policies make economic sense: findings from existing research evidence

The idea of investment in the caring industries and social infrastructure is comparatively new but evidence of its effectiveness is now beginning to emerge. In addition, some governments have been following this approach.

From 1997 the Republic of Korea has recognised the importance of investing in child care taking the view that early childhood education is 'the best educational investment' a country can make in 'building a foundation of holistic development of human beings' (Peng, 2009: 16). In addition it was thought that such investment would reduce families' financial burdens, raise women's social and economic participation and that this 'socialization of child and elderly care would create new economic growth engines' (Ibid.: 34). In this case the government seems to have recognised that there can be harmony between economic and social objectives.

The Korean example is not isolated; the European Union has repeatedly argued in favour of the instrumental social investment state, with investment in education and health (and childcare) to secure the future workers' productivity and thus economic competitiveness. The Barcelona Summit in 2002 set an ambitious childcare enrolment target for all member states to achieve by 2010; this was seen as a key instrument of boosting female employment (see country profiles). In particular Germany has stepped up its level of investment in childcare since the mid-2000s. Japan, faced with a rapidly ageing population and very low fertility, has also embarked on substantive reforms to boost childcare coverage. Long-term care on the other hand was somewhat left out of this vision of social investment, as the efficiency argument of boosting the productivity of its direct beneficiaries could not be made in the same terms even in the long-term. However provision of high quality adult long-term care services does contribute to the economy through improving the health and autonomy not only of recipients but also of informal carers.

Photo: ILO

Informal carers could be freed to pursue other 'productive' activities. High - quality care provision would keep all workers free from the stress of having to care for their elderly relatives or worrying about how their own future care needs would be met, thereby creating a virtuous social contract between groups and generations.

Consultants ICF GHK (2015) focused on identifying the economic contribution of adult social care in England. In this case by social care they are referring only to care for the elderly. They estimated the Direct Economic Value of the Sector itself, the Indirect Economic Value as a consequence of the demand it generates for goods and services from other sectors, and, finally the Induced Economic Value as a consequence of all these workers spending their earnings.

They found that including all these effects the social care sector leads to 1.5 million workers (1.3 million full time equivalent, which is 6.4% of the workforce) being employed and generates Gross Value Added (GVA) of £20 billion or 1.8 % of total national output. This overall number of employees is marginally higher than the numbers generated by construction, transportation or public administration. In addition the social care sector generates more GVA than the legal sector, the production and distribution of electricity and gas or the arts, entertainment and recreation industries. The point of the analysis, which was carried out for an employer-led agency, was to highlight the comparative significance of social care.

Using a parallel form of analysis to our own empirical investigation, Rania Antonopoulos and Kijong Kim (2011) investigate the effects of investment in social care (by which they mean child care and social care for the elderly), in South Africa and the United States. As part of their analysis they estimate the impact of an investment equivalent to 1% of GDP in social care compared to a similar investment in physical infrastructure and calculate the direct and indirect employment impact (but not induced effects), and the distribution of these jobs by gender and income group.

In both countries they find that the number of jobs created by investment in social care is approximately twice as many as those generated by a similar level of investment in physical infrastructure, in line with our results for the US.[6] They also find that the gender composition of the jobs fits the stereotypical pattern with the jobs generated by investment in social care being disproportionately taken by women and the physical infrastructure jobs being taken by men. What is particularly striking in the South African simulation is that women take only 55% of the jobs generated by investment in social care – taking directly and indirectly generated jobs together. In comparison women take only 18% of the jobs generated by investment in physical infrastructure. Thus while most of the jobs directly created in social care go to women, in this case jobs for men are also created to a greater extent following investment in social care than in physical infrastructure[7].

Such findings are supported by the work of Hannah Bargawi and Giovanni Cozzi (2014) — using the Cambridge-Alphametrics macro-simulation Model (CAM). Their study investigates the feasibility of alternatives to austerity for the Eurozone. They find that it is possible to have economic growth, an expansion of employment (with a bias towards female employment) and yet lower the public debt and deficits. Indeed, this model estimates that a gender-sensitive macroeconomic scenario based on an expansion of government investment and expenditure and targeted at female employment would produce better outcomes in terms of EU economic and social objectives than the 'business-as-usual' approach of pursuing austerity. More specifically, they find that investment that specifically targeted female employment would result in higher levels of employment overall, higher levels of economic growth and a greater reduction in debt as well as greater reductions in the employment gap between men and women.

So there is growing evidence to suggest that it is possible to have gender sensitive policies and economic growth – indeed these findings suggest that gender equitable policies that contribute to human development also make economic sense. Our empirical analysis that follows investigates this idea further by contrasting the differential impact of public investment in social infrastructure compared to physical infrastructure for seven OECD countries.

Photo: www.nurses-forum.com

6 Specifically their results come from ex-ante policy simulation results. Both social accounting matrix-based multiplier analysis and propensity ranking-based microsimulation provide evidence of the pro-poor impacts of the social care expansion.
7 Since for every 100 jobs created in physical infrastructure (82 for men), 200 are created in social care (and thus 45%*200=90 for men).

Overview of the countries studied

Care systems

A summary of each country's care regime is provided in Appendix 1. Overall, the seven countries chosen for this analysis differ in the extent to which the state intervenes directly in providing care services for its population, both for preschool children and for adults needing help with daily activities. Following the traditional welfare regime typology identified in the literature, Denmark stands out from the pack for having a well developed, social-democratic provision of care services that are affordable, publicly-run or subsidised and of high quality and reach. The UK, Australia and the US, usually classified as liberal regimes, do not provide substantial state services and when they have financial support in place, it tends to be by using transfers to families or care recipients to purchase services on the market. Germany, Japan and Italy – not always grouped together in welfare regime analyses depending on the range of social policies that are considered – have traditionally relied on family members (mainly women) to provide care to children and elderly at home. These informal carers are untrained but not always unpaid; some financial support for stay-at-home carers has been made available, especially in Germany. However, in recent years, Germany and Japan have implemented social insurance systems to provide for long-term care, while investing directly in the provision of childcare services, while Italy only pushed for more public services in childcare.

In all countries but Denmark the provision of care remains insufficient and many women still provide the bulk of care to both adults and children. Affordability of care and thus access for low income families is the main issue in the UK and the US, although in some cases availability of services, especially of childcare, is also of major concern. In the other countries it is more an issue of availability of places and opening hours rather than fees, as existing services are better subsidised but are scarce.

Table 1 shows figures for public spending on childcare and enrolment rates for children under the age of five. In all countries enrolment rates reflect availability of spaces, as there is excess demand. Enrolment rates for children aged 3-5 are considerably higher than for children aged 0-2. Note that, for Australia and the UK, average weekly hours of use of childcare for both age groups is considerably lower than in other countries.

Note that we do not have data for private spending on childcare, although the totals in the first two columns of Table 1 include public cash transfers (childcare subsidies) to parents to pay for private childcare services. Out of pocket remaining fees vary from 0% of a typical dual-earner family's net income in Denmark and Germany to 50% in the US (OECD Family Database, 2014).

Table 1 Summary indicators of childcare provision

	ECEC	Chi 0-5	Children 0-2		Children 3-5	
	Public spending % GDP	Public spending % GDP	Enrolment % chi	Average hours	Enrolment % chi	Average hours
Australia	0.38	0.59	31	22	65	13
Denmark	1.51	1.51	74	35	96	34
Germany	0.49	0.49	24	30	94	28
Italy	0.62	0.62	26	31	95	33
Japan	0.13	0.13	26	35	89	25
United Kingdom	0.44	0.82	35	14	94	20
United States	0.37	0.37	26	32	70	32

Notes: (1) OECD family database figures on public spending for Japan (0.45), UK (1.1) and Denmark (2.0) are higher because they include spending on social services and child protection. (2) Figures for Australia and UK in second column include primary education spending for children aged 5.
Source: see Appendix 1 for country profiles.

Spending on adult long-term care is more difficult to estimate, so Table 2 provides a summary of different sources and the combined estimate of public spending on long-term care services. Public spending on long-term care services constitutes a larger share of GDP than childcare services. Note that private spending (households' out-of-pocket spending), as measured in the OECD social expenditure database and the Eurostat health expenditure database, is lower than public expenditure. As detailed in the country profiles in Appendix 1, the majority of long-term care is still provided by informal unpaid carers, mainly the partner or child(ren) of the person in need. In Denmark, 52% of dependents did not use any formal LTC services in 2010 compared with 72% in Germany, 74% in the UK and 76% in Italy (Lipszyc et al., 2012).

Table 2 Public and private spending on long-term care (various sources)

	OECD SOCX		Eurostat		Lipszyc et al. 2012		Estimate
	LTC 2011		LTC 2011		LTC 2010		LTC 2011
	Public in-kind % GDP	Private in-kind % GDP	Public in-kind % GDP	Private in-kind % GDP	Public in-kind % GDP	Public cash % GDP	Public in-kind % GDP
Australia	0.887	0.005	0.10	0.01	-	-	0.80
Denmark	2.300	0.185	2.35	0.19	2.47	2.04	2.35
Germany	1.545	0.524	1.02	0.39	0.98	0.45	1.02
Italy	-	-	-	-	1.04	0.86	1.04
Japan	0.781	0.129	1.87	0.23	-	-	1.87
United Kingdom	-	-	-	-	1.42	0.56	1.42
United States	0.578	0.384	0.57	0.39	-	-	0.57

Source: see Appendix 1 for country profiles

As in the case of childcare, Denmark stands out by spending proportionately much more on long-term care than other countries, followed by Japan. In Japan, a large share of public spending is directed towards the social component of the long-term care services (that is help with instrumental activities such as cleaning and cooking) as opposed to the health component of nursing care (including personal hygiene), which constitutes the bulk of public spending in most countries.

Labour markets

In part reflecting differences in care provision, the employment patterns of men and women in the seven countries studied show that both more employment and greater hours of employment could be achieved. This is especially the case for women, whose employment rate lags behind that of men by between 6.5 percentage points in Denmark and more than 20 percentage points in Italy and Japan (Table 3). Women are more likely to work part-time and earn less per hour than men in all countries, again with marked variations between care regimes. In no country has gender equality of employment, not just in terms of overall rates but also quality and working conditions, been achieved.

Table 3 Main labour market indicators

	Empl. rate 15-64 (Q4 2014)		PT frequency (2014)		Unempl. Rate (Q4 2014)		Gender wage gap (2013) (FT employees)	Empl. rate of mothers 15-64 (youngest child 0-5) (2013)
	Men	Women	Men	Women	Men	Women		
Australia	77.1%	66.1%	14.0%	38.3%	6.3%	6.4%	18.0	51%
Denmark	76.1%	71.0%	14.6%	25.4%	6.6%	6.4%	7.8	77.7%
Germany	78.1%	69.7%	9.1%	37.5%	5.4%	4.6%	16.6	61.9%
Italy	64.8%	46.9%	8.6%	32.9%	12.1%	14.4%	11.1	52.2%
Japan	81.6%	64.2%	12.0%	37.2%	3.8%	3.4%	26.6	42.9%
UK	77.0%	67.6%	11.7%	38.1%	6%	5.5%	17.5	60.6%
US	73.9%	63.3%	8.0%	16.8%	5.9%	5.7%	17.9	58.6%

Notes: source is OECD employment database and family database. Maternal employment rate for Japan is for women aged 25-54 and for the year 2010.

Care employment

Table 4 below shows the number of full-time equivalent (FTE) employees in the two industries considered for this analysis and overall, the percentage of the total who are employed in each industry, as well as the proportions of employees in each industry who are women.

Table 4 Employment in care and construction

	No. FTE employees (000s)			% of total (FTE)		% women (HC)	
	All	Constr.	Care	Constr.	Care	Constr.	Care
Australia	8807.1	703.8	400.9	8.0%	4.6%	11%	79%
Denmark	1752.7	112.4	200.6	6.4%	11.4%	8%	81%
Germany	29747.4	1982.9	1380.9	6.7%	4.6%	13%	75%
Italy	15566.1	1135.6	337.7	7.3%	2.2%	6%	85%
Japan	46932.7	4775.0	2224.3	10.2%	4.7%	14%	77%
UK	21580.5	1284.4	1301.1	6.0%	6.0%	11%	80%
US	122269.0	5903.0	5116.0	4.8%	4.2%	13%	81%

Source: See Appendix 3

Table 5 shows the compensation per FTE employee for each industry (as a proportion of the average compensation per employee across all industries) and the ratio of average compensation in the two industries. It shows that in four countries (Australia, Germany, Denmark and Italy) employees in the care industry are only slightly less well paid than in the construction industry, and they are better paid in Japan. However they all get a lower compensation than the national average except in Australia. By contrast, in the UK and the US, employees in the care industry are paid about half of what construction workers are paid and far less than the national average.

Table 5 Compensation of employees per FTE (% of average compensation)

	Constr.	Care	Ratio care/cons.
Australia	108%	106%	97%
Denmark	90%	85%	94%
Germany	79%	70%	88%
Italy	76%	69%	90%
Japan	73%	81%	112%
UK	100%	44%	44%
US	70%	38%	54%

Source: see Appendix 3

Appendix 3 gives an overview of the occupational composition of the main care industries for some countries. Although care industries in most countries have a variety of occupations with different qualifications, data for the US and Japan show that care-related occupations account for a large majority of employment in these industries (above two-third, including nurses and healthcare professionals).

Table 6 shows the average earnings in selected care work occupations compared with that of registered nurses and primary education teachers. Data could only be found for four countries (see Appendix 4 for more detail). Care workers in all four countries are paid well below the national average, and earnings do not differ much between childcare and long-term care workers. Note that both sorts of care workers in Australia are paid much less than the national average unlike, as Table 4 above shows, other workers in the care industry. Note also that the difference in pay between care workers and qualified nurses and primary school teachers is particularly large in the US and relatively small in Denmark.

Table 6 Earnings in care occupations (% of average earnings in all occupations)

	Nurses	Teachers (primary)	Child-care workers	Long-term care workers
Australia (All)	103	108	45	57
Denmark (Full-time)	97	99	67	73
UK (All)	104	113	45	55
US (Full-time)	138	124	56	55

Source: See Appendix 4 (average weekly earnings of employees; for Denmark, monthly earnings)

Working conditions in the care industry, characterised by unpredictability of working hours (especially for long-term care occupations), tiring shifts, low pay and irregular work contribute to problems of recruitment and retention, putting pressure on the overall quality of care services despite workers' commitment to delivering high standards (OECD, 2011a; EC, 2014).

Simulating direct, indirect and induced employment effects of public investment

The analysis that follows assesses the total employment generating effects of investing in physical and social infrastructure, and the gender breakdown of these effects. Using input-output tables and other official statistics[8], we calculate[9] the direct, indirect and induced employment effects of an investment equal to 2% of GDP made to either the care or the construction sector[10], taking these two sectors as typical examples of where social and physical infrastructure investment is made, respectively. We also look at the gendered breakdown of each of these employment effects.

Calculating total employment effects that include indirect and induced effects can be done by using input-output tables provided by national statistical offices. These tables show how industries are linked in the supply chain of goods and services that eventually meet final household, government and export demand. Input-output tables show how much output of each other industry (and how much of its own output) each industry's production process uses as inputs. We can add information on how much labour is used in the production process of each industry, and express all information as input requirements per unit of each industry's output. (Note that the way this is used assumes that these requirements do not change with the scale of demand for an industry's output.)

How much direct employment can be created by investment in a given industry depends on how much labour its production process requires and on the costs of employing that labour (employee remuneration, employers' social security contributions and other costs). Indirect effects are calculated for each industry by using the I-O tables to calculate total input requirements down the supply chain (including imported components) for the production of one unit of output of that industry. Total (direct and indirect) employment (also known as Type I) effects are then the total of these inputs, each multiplied by employment per unit of output in its production process. We then obtain the indirect employment effect for each industry by subtracting its direct employment effect, as calculated above.

Calculating the induced employment effect follows a similar method, only that the input-output tables are augmented in a different way, this time with information about household expenditure patterns. Households are effectively treated as another industry, using inputs produced by all industries but producing no output, whose level of expenditure depends on total household income, which is in turn determined by the total level of employment. Any additional employment then generates increased household income and thus induced demand which itself travels through the supply chain generating direct and indirect employment effects. This gives for any additional investment total (direct, indirect and induced) employment (also known as Type II) effects, from which the induced effects can be isolated by subtracting the direct and indirect (Type I) effects, as calculated above.

Deriving employment effects by gender is achieved by applying the proportions of men and women in each industry found in the latest employment surveys. As at all steps in this analysis, this makes the assumption that current proportions do not change as a result of such investments.

A more detailed explanation of the method used for our analysis is outlined in Appendix 2. The reference year of the input-output tables is 2010 for the UK, Italy and Germany, 2011 for Denmark and Japan, 2012 for Australia and 2013 for the US.

8 For statistical sources: see Appendix 3
9 For methodology: see Appendix 2
10 The exact definition of these two sectors varies across countries: see Appendix 3

Direct Effects

Table 7 gives the direct employment effects by country, that is, the number of new jobs directly generated by an equivalent investment in the construction or the care industries. Since countries differ in the size of their working age population, the easiest way to compare effects is to give the numbers of newly employed people as a percentage of each country's working-age population (15-64 years), that is, the percentage points by which its employment rate would rise.

Table 7 Direct employment effects

	Construction			Care		
	Number of jobs generated	Rise in head-count employment rate (% points)	Number of FTE jobs generated	Number of jobs generated	Rise in employment rate (% points)	Number of FTE jobs generated
Australia	74,791	0.5	68,859	356,812	2.3	269,842
Denmark	29,380	0.8	22,989	75,228	2.1	47,359
Germany	504,181	0.9	476,299	1,402,416	2.6	1,125,163
Italy	230,904	0.6	224,297	562,869	1.4	508,276
Japan	1,143,819	1.4	1,052,666	1,612,291	2.0	1,313,488
UK	300,787	0.7	287,436	746,409	1.8	608,320
US	2,575,090	1.2	2,510,713	7,146,507	3.4	5,511,897

It can be easily seen from Table 7 that the direct employment effects of an investment in care are considerably larger than those of an equivalent investment in construction. There are a number of reasons why this is to be expected. First, care is a far more labour intensive industry than construction, which uses a number of inputs other than labour, whereas the majority of the costs of providing care consist of care workers' wages and relatively little equipment and raw materials are needed. Second, in some countries but not all, workers in the care industry (in particular those providing care directly) are paid less than many construction workers. This is only marginally true in most countries, except in the UK and the US where there is a large difference in wage levels and a given amount of money will employ considerably more care workers than construction workers. Finally, care workers are employed on average for shorter hours than construction workers, since many care workers are employed part-time or for variable hours (e.,g., on zero - hours contracts). Much remains to be done to improve the quality of jobs for care workers, particularly women.

The third column under each industry allows for this last difference by looking at the number of full-time equivalent jobs (FTEs) created under our simulation's assumption that the employment structure in each sector remains unchanged. Under this assumption, even in terms of FTE jobs directly generated, investment in care still clearly outperforms investment in construction.[11]

However, in practice such a massive investment in a sector is likely to have considerable effects on working conditions (and pay) within the sector, particularly a sector that is already experiencing recruitment and retention problems due to poor pay and conditions as discussed above. If this is the case then, while the total amount of employment generated in the care industry may be reduced, the jobs will be of higher quality.

An increase in investment in either sector may also lead to the substitution of capital for labour i.,e., the use of labour saving technology. Unlike the considerable scope for labour-saving technology in construction, its use is inherently limited in care, albeit there is some scope that increased investment may encourage for its use in monitoring and communication. In this case our results may again overestimate the number of jobs generated, but will do so more for the construction sector than for the care sector. Investment in care will continue to have a considerably higher direct employment effect so long as it remains more labour intensive than construction, and the wages of care workers do not overtake those of construction workers, even if employment conditions in the two sectors were to start converging.

There is some variation between countries in the size of these effects, with the direct employment effects of investment ranging from half of a percentage point in Australia to 1.4 percentage points in Japan. The range is even bigger for the care sector, ranging from less than 2 percentage points in Italy and the UK to more than 3 percentage points in the US.

11 Note that for the US calculations we used the number of jobs rather than the number of people employed, therefore marginally overestimating the employment rate effects. Also, FTE jobs couldn't be calculated for all industries by gender so that only direct effect overall is shown here and the remainder of the US analysis uses headcount figures only.

What counts as a direct employment effect partly depends on the internal contracting structure of an industry; where workers are indirectly employed through contracting out their employment will appear as an indirect effect. So some of variation in the size of direct employment effects could be a result of the internal structure of the industries varying across countries. Outsourcing within the industry will reduce direct employment effects but will increase indirect effects, as will become clear below when we discuss indirect employment effects.

Table 8 shows that the direct gender employment effects of investment in the two industries are quite different. Both industries are heavily gender segregated, particularly construction. As a result only 6-14% of the jobs directly generated in construction would go to women in our simulation. Note, however, that the simulation assumes that the male domination of the construction is not challenged in the course of increasing investment in it (see Appendix 2). Any government looking to reduce gender inequalities would presumably attempt to change that male domination in making such an investment. Without doing so successfully, the gender gap in employment for the economy as a whole would increase with an investment in construction. This can be seen from Table 8 where the investment in construction results in a direct rise in men's employment rate of between 0.9 and 2.4 percentage points, while for women a direct rise of between 0.1 and 0.4 percentage points is all that can be expected.

Table 8 Gendered direct employment effects

	Construction			Care		
	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)
Australia	11%	0.1	0.9	79%	3.7	1.0
Denmark	8%	0.2	1.5	81%	3.4	0.7
Germany	13%	0.2	1.6	75%	3.9	1.3
Italy	6%	0.1	1.1	85%	2.4	0.4
Japan	14%	0.4	2.4	77%	3.1	0.9
UK	11%	0.2	1.3	80%	2.9	0.7
US	13%	0.3	2.1	81%	5.5	1.3

Care is almost as gender segregated but in the opposite direction. The direct effect of investing in care would therefore be to reduce the gender gap in employment for the economy as a whole. The investment in care would result in an increase in the employment rate of women of between 2.4 and 5.5 percentage points, while for men that rise of between 0.4 and 1.3 percentage points is considerably smaller in all countries (though still larger than that for women of investing in construction), reducing every country's gender gap in employment by at least 2 percentage points. That the direct effect of investment in care on women's employment rate is so much greater than that of investment in construction on men's employment rate simply reflects the former's greater direct employment effect discussed above. Challenging gender segregation in every industry is an important contribution to promoting gender equality, and getting more men into caring occupations has been seen as desirable in itself. However, as our results show, if that gender difference persisted, investment in care would remain a highly effective way of narrowing the overall gender gap in employment.

But there are good reasons to think that if an investment of this magnitude was made, the female domination of the care sector might be reduced. The better wages and working conditions that would be necessary to achieve such an investment in care would be likely to attract more men into the industry, particularly if policies were in place to encourage and facilitate their entry. In this case investment in care would have a beneficial effect on a wider range of gender inequalities: it would reduce occupational segregation by gender and the gender pay gap; it would also still make the gender employment gap smaller though perhaps to a somewhat lesser extent than the estimates of the gendered direct employment effects in Table 8 suggest.

Indirect effects

Investment in any industry will generate additional indirect employment effects as demand is increased for the products of its suppliers. Such demand and employment effects will ripple down the supply chain, generating indirect employment effects in many industries (including within the industry/ies in which the original investment was made). We do not here present the division between indirect effects that are within each industry itself, and those that are outside effects on other industries, but as noted above it should be borne in mind that the distinction between direct and indirect within industry employment effects depends on the internal contracting structure of an industry. All other things being equal, industries that engage in more internal subcontracting will have higher indirect effects and lower direct effects than industries that tend to employ labour directly.

In most countries, the indirect employment effects of investment in construction are larger than those in care. This is to be expected, since construction uses more inputs provided by other industries than a labour intensive industry such as care. Two outliers are worth discussing at this point: the care effect for the UK and the construction effect for Australia.

Table 9 Indirect employment effects through the supply chain

	Construction			Care		
	Number of jobs generated	Rise in headcount employment rate (% points)	Number of FTE jobs generated	Number of jobs generated	Rise in employment rate (% points)	Number of FTE jobs generated
Australia	180,087	1.2	161,816	40,663	0.3	34,525
Denmark	18,135	0.5	13,873	10,744	0.3	7,511
Germany	263,281	0.5	236,188	185,001	0.3	159,437
Italy	265,789	0.7	250,276	188,437	0.5	171,133
Japan	598,642	0.7	524,557	378,888	0.5	142,668
UK	231,389	0.6	213,572	509,528	1.2	420,673
US	1,426,866	0.7	n/a	1,326,773	0.6	n/a

Our calculations identified that the UK has a much larger indirect effect, nearly all of which (0.8 percentage points) is due to indirect employment effects within the care sector. The UK's care industry's indirect employment effect on other industries at 0.4 percentage points is similar to that of other countries. This suggests that the care sector in the UK outsources a larger proportion of its inputs within itself than the care sector in other countries (and indeed than the construction sector in many countries). One possible explanation for this is the recent intense privatisation of care in the UK – such restructuring may lead to greater outsourcing and contracting through agencies. This is consistent with a direct employment effect in the UK that is lower than most, so that the sum of total within-industry effects (both direct and indirect) is in the middle of its range over the countries studied. Total employment effects will be analysed below.

The other outlier is Australia, whose residential construction sector generates particularly large indirect employment effects (and the lowest direct employment effect). This seems to reflect recent changes in the Australian construction industry that saw increases in outsourcing to specialised trades in other industries and sub-contracting between firms within the construction sector (Toner, 2006).

Table 10 shows the gender breakdown of these indirect employment effects.

It is striking that the indirect employment generated by the construction industry is still male-dominated, though less so than its direct employment. For the care industry that is not the case. Indeed the balance of indirect employment generated favours men somewhat, except in the UK, whose large indirect effect is primarily within the care sector itself, which as we know is female-dominated.

As a result the indirect employment effects of investment in construction raise men's employment rate more than women's, increasing the gender employment gap. In most countries the rise in the gender employment gap is by between 0.3 and 0.7 percentage points, but in Australia it is by a whole percentage point. Successful efforts to tackle the male domination of the construction industry's suppliers, as well as that of industry itself, would be necessary to mitigate these effects.

Table 10 Gendered indirect employment effects

	Construction			Care		
	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)
Australia	30%	0.7	1.7	42%	0.3	0.3
Denmark	31%	0.3	0.7	42%	0.3	0.3
Germany	33%	0.3	0.6	50%	0.3	0.3
Italy	24%	0.3	1.0	53%	0.5	0.4
Japan	34%	0.5	1.0	42%	0.5	0.5
UK	23%	0.2	0.9	67%	1.2	0.8
US	37%	0.5	0.9	43%	0.6	0.7

Induced effects

Besides indirect effects there are also induced employment effects as a result of the additional household income generated by the additional employment. Some of this additional household income will be spent and become a further source of increased demand within the economy, generating jobs in the sectors in which households spend their income.

Table 11 shows these induced effects. Note that these effects are more controversial and some national statistical offices do not calculate them. We have included them because when calculated they often turn out to be substantial, but they are given here with the proviso that their magnitude must be taken as somewhat approximate. One reason for this caution is that we have had to treat all household income as being spent in the same way, as is the usual practice by those statistical offices that do calculate induced effects[12]. Ideally, for the purpose of comparing the effects of investment in two different sectors, we would have liked to be able to consider the spending propensities of different types of households and the likely distribution of construction and care workers (and those indirectly employed) among such households. To do so would have required analysing micro-level household expenditure data, which was beyond the scope of this project, although we can comment on the likely direction in which our estimates of induced employment effects might move if such micro-level analysis were to be carried out.

Table 11 Induced employment effects through household spending

	Construction			Care		
	Number of jobs generated	Rise in headcount employment rate (% points)	Number of FTE jobs generated	Number of jobs generated	Rise in employment rate (% points)	Number of FTE jobs generated
Australia	132,574	0.9	109,626	216,122	1.4	178,713
Denmark	20,896	0.6	13,745	31,153	0.9	20,491
Germany	272,570	0.5	232,887	432,368	0.8	369,420
Italy	123,880	0.3	112,332	194,350	0.5	176,233
Japan	1,350,489	1.7	1,140,271	1,478,403	1.8	1,242,336
UK	212,468	0.5	181,581	292,151	0.7	249,680
US	3,444,418	1.6	n/a	4,438,219	2.1	n/a

12 We have broadly followed the methodology of National Statistics Scotland, adapting it where necessary to the data limitations of particular countries. For further details, see Appendix 2: Methodology

The induced effects of investment in the care sector are larger than those of the construction sector simply because the former raises total household income more. This is because the larger overall employment effects must outweigh the lower pay of the care sector. Another way to interpret the relative rise in total household income is that it shows the care industry to be using fewer imports directly and indirectly than the construction industry, so that a larger proportion of the employment creation of investment in care stays within the domestic economy.

Since lower income households are likely to have a greater propensity to spend any additional income, our methodology, by treating all household income as spent in the same way, will in practice underestimate the employment-inducing effects of investment that results in an increase in earnings going to lower income households. As Table 5 shows, only In Australia are care and construction workers paid above average wages, and in the UK construction workers receive average wages. In all other countries workers in both sectors receive below average wages, and in the US and the UK care workers are on average paid particularly poorly and thus are more likely to live in lower income households, all else equal. We can therefore assume that the propensity to consume and therefore induced employed effects might in general be somewhat greater than those given in Table 11, and particularly for employment generated by investment in the care industry in the US and the UK.

Table 12 shows clearly that the induced effects do not have a specifically gendered character, simply reflecting the roughly equal gender composition breakdown of employment in the sectors producing the goods and services that households purchase.

It also reveals how the only difference in the induced effects of the investment between the two industries that our methodology can pick up is one of scale. Induced effects, as calculated here, are simply proportional to the total additional wage bill paid through the direct and indirect employment effects. However, in reality there is good reason to think that the induced effects might not be proportional, once we take account of most care workers being women and thus in practice more likely than construction workers to need to spend money to replace their own unpaid labour if they take a job or increase their hours of employment. Particularly where the unpaid labour is replaced by services, as it must be to meet domestic care responsibilities, that money will be spent in ways that generate local employment. This is more likely to be the case in countries where care is not well subsidised and remain expensive for users, as in the UK and the US (at least for childcare as the country profiles show).

For this reason it is likely that the induced effects of investment in care are somewhat underestimated and in particular underestimated relative to those of investment in construction.

Table 12 Gendered induced employment effects

	Construction			Care		
	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)
Australia	49%	0.9	0.9	49%	1.4	1.5
Denmark	47%	0.5	0.6	47%	0.8	0.9
Germany	51%	0.5	0.5	51%	0.8	0.8
Italy	44%	0.3	0.3	44%	0.5	0.5
Japan	43%	1.4	1.9	44%	1.8	2.0
UK	46%	0.5	0.6	46%	0.7	0.8
US	52%	1.7	1.6	52%	2.1	2.0

Total effects

It is the total employment effects that matter in understanding how investment can be used to generate employment. Table 13 gives these by summing the above direct, indirect and induced employment effects.

We can see that in all countries the employment inducing effect of investment in care is higher than that of an equivalent investment in construction, at least 50% higher in all countries except Japan, where construction has unusually large employment generating effects (both direct and indirect). In Italy the effects for both sectors are smaller (more so for care) than for other countries with both direct and induced effects amongst the smallest. This is in part due to a larger proportion of full-time employment than in other countries. In full-time equivalents, Denmark has a lower overall rise in employment rate than Italy for example (2.1 versus 2.2). Another reason might be that because social care in Italy is so underdeveloped, especially as formal at-home care is virtually inexistent, the more capital intensive residential care might feature more prominently in relative terms in official statistics and thus the employment effect is lower in Italy than say, Germany, where relative wages are of the same magnitude (Table 5). It is unlikely that the input-output tables capture the contribution of the grey economy, which is widely developed in Italy's social care system[13].

Table 13 Total employment effects

	Construction			Care		
	Number of jobs generated	Rise in head-count employment rate (% points)	Number of FTE jobs generated	Number of jobs generated	Rise in employment rate (% points)	Number of FTE jobs generated
Australia	387,452	2.5	340,300	613,597	4.0	483,080
Denmark	68,412	1.9	50,607	117,124	3.2	75,361
Germany	1,040,031	1.9	945,373	2,019,786	3.7	1,654,019
Italy	620,573	1.6	586,905	945,655	2.4	855,642
Japan	3,092,950	3.8	2,717,494	3,469,582	4.3	2,877,691
UK	744,644	1.8	682,588	1,548,087	3.7	1,278,673
US	7,446,375	3.5	n/a	12,911,500	6.1	n/a

13 See more details and sources in the country profile in Appendix 1.

Further as Table 14 shows, the employment effects of investing in care would also reduce the gender employment gap by having a stronger effect on women's employment rate than on men's. Table 15 shows what the employment gap is in each country and by how much it would be reduced or increased by each type of investment.

Table 14 Gendered total employment effects

	Construction			Care		
	% of jobs generated taken by women	rise in employment rate of women (% points)	rise in employment rate of men (% points)	% of jobs generated taken by women	rise in employment rate of women (% points)	rise in employment rate of men (% points)
Australia	33%	1.7	3.4	66%	5.3	2.8
Denmark	27%	1.0	2.7	69%	4.5	2.0
Germany	28%	1.1	2.8	68%	5.1	2.4
Italy	21%	0.7	2.5	70%	3.3	1.4
Japan	30%	2.3	5.3	59%	5.1	3.4
UK	24%	0.9	2.7	69%	5.1	2.3
US	35%	2.5	4.6	67%	8.2	4.0

Table 15 Gender employment gap and effects on it of investment of 2% of GDP in Construction or Care Industries

		Construction		Care	
	Existing gender employment gap	Percentage point change in gender employment gap	As % of existing gender employment gap	Percentage point change in gender employment gap	As % of existing gender employment gap
Australia	12.2	1.8	15%	-2.6	-21%
Denmark	6.5	1.7	26%	-2.5	-38%
Germany	9.4	1.7	18%	-2.7	-29%
Italy	21.1	1.8	9%	-1.9	-9%
Japan	23.1	2.9	13%	-1.6	-7%
UK	9.9	1.8	18%	-2.8	-28%
US	8.7	2.1	24%	-4.2	-48%

While investment in construction increases the gender employment gap, investment in care decreases it substantially while increasing both women's and men's employment rates. The relative reduction is strongest in the US and Denmark where existing employment gaps are the lowest whereas the gaps are least reduced in Italy and Japan where they are the largest of the seven countries studied.

This analysis does not show that investment in construction is not worthwhile. Rather that since at least as large employment effects can also be generated by investment in care, with particularly beneficial gender equality effects, the mix of investment has to depend on what benefit the results of each type of investment would in itself generate for society. It can no longer be made simply on the grounds that investing in physical infrastructure is the best way to stimulate employment.

Reducing the employment gap is not the only gender inequality that could be improved through investment in care. Wages and working conditions in the care industry would have to improve considerably if such an investment were to be successful, given existing retention and recruitment problems in the industry. Such investment would therefore have to entail training and professionalization, which would be of benefit not only to care workers but to the people that they care for. Achieving high quality care is a gender issue in its own right, since women predominate among one significant section of care recipients, the elderly.

Once basic needs are met, investment in care may result in more jobs being created to extend coverage in terms of hours of care, raise staff/client ratios and improve training. Better training would also result in wages being increased, which should also improve care standards, particularly for those with particular types of care needs. Even in Denmark, where this exercise may seem irrelevant given that most needs for social and childcare are covered (at least in terms of the numbers of children and adults in need of care who are being formally looked after), there is still scope for improvement. So we might expect that any additional employment created by investment in care in Denmark would improve quality rather than coverage, with increased staff ratios and better working conditions. In particular Denmark's social care system has high turnover owing to difficult working conditions, as in other countries, despite its well-developed system that seems to provide for all critical needs (Schultz, 2014).

The benefits of care provision in itself are considered elsewhere in this report. That in itself makes the strongest case for investing in care. But the employment effects are considerable too, and their substantial effects on gender inequalities reinforce that argument.

Summary of employment and growth effects

Figures 1 and 2 below summarise the employment effects that have been discussed in detail above.

Figure 1 Contribution of men's and women's employment to the rise in employment rates by industry and country

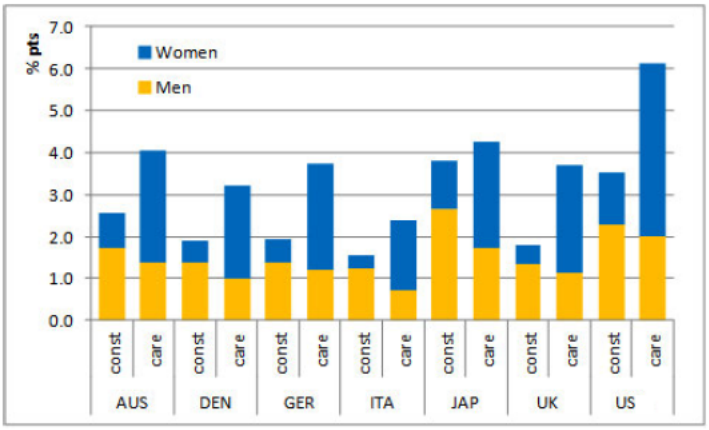
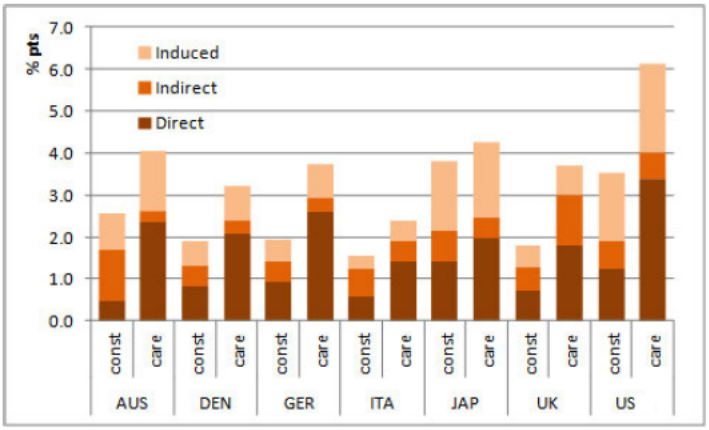
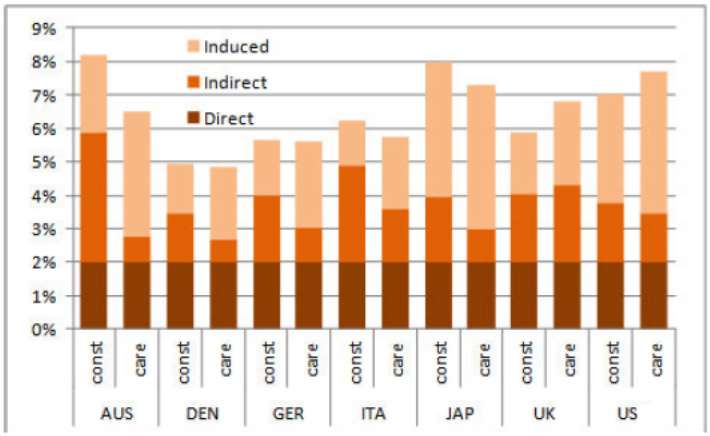


Figure 2 Contribution of direct, indirect and induced effects to the rise in employment rates by industry and country



Effects of the investment in care or construction can also be analysed with respect to output and GDP growth. Figure 3 shows the effect on output (GDP) of the same investment equal to 2% of GDP in each of those two industries. In this case the direct effect is just that initial 2% from the initial injection in the economy. Indirect and induced output effects vary between countries: in Australia and Japan, total effects are larger for investment in the construction than in the care industry, but it is the other way around in the UK and the US, while no major difference overall is observed in Italy, Germany and Denmark. In Australia, Japan and the US, GDP is boosted by about 7%, i.e., 5 percentage points above the initial injection, reflecting an output multiplier, that is the ratio of total to direct effects, of around 3.5-4 for both industries. Effects are smallest in Denmark.

Figure 3 Contribution of direct, indirect and induced effects to GDP growth



It is the labour intensity of the care industry that causes larger employment effects of investment in it not to result in larger output effects than for construction industry (in Australia, Italy and Japan at least). This would change if care was more valued and its workers better paid, but then the employment effects would be smaller too. The case for care as a more effective form of stimulus than construction does not hold consistently across countries if we are looking at effects in terms of GDP. Either form of investment provides a stimulus that generates good returns in terms of both employment and output. In choosing the mix of investment, probably the most important consideration are the benefits of the investment itself, though it remains that case that investment in care always does more for gender equality.

Additional simulations for long-term projections

Using a different simulation tool, the Cambridge Alphametrics Model (CAM), we have also projected what would be the result on employment in the medium-to-long-term from different investment scenarios, similar in focus to those explored above, but with slightly different assumptions and parameters. CAM is a demand-driven global macroeconomic model that can be used for medium-to-long-term projections of historical trends of the global economy, major blocs of countries and major countries (Cripps and Kurasee, 2010).

In this analysis, the model is used to project employment and GDP effects of different policy scenarios into the year 2030. Three scenarios are considered: (1) a business as usual scenario in which current economic policies continue into the foreseeable future, including fiscal consolidation and modest investment plans within budget constraints; (2) an overall investment boost with increases in private and public investment and spending over and above the business-as-usual scenario, but not targeted at any particular industry; (3) a gendered investment boost in which scenario (2) is applied but investment is marshalled in such a way that it prioritises increasing female employment, implicitly by targeting a larger increase in female employment rates than in overall employment rates.

The model is applied to different sets of countries or blocs of countries that reflect the choice of OECD countries in our main analysis. Not all countries are identifiable individually in CAM. Italy is included in the bloc "Eurozone periphery" alongside Spain, Greece and Portugal; Australia is grouped with Canada and New Zealand and Japan features with South Korea in a block of high income East Asian countries. Denmark cannot be easily analysed, as Scandinavian countries are grouped together with countries in Eastern Europe, such as Poland and Czech Republic, which makes results for them difficult to interpret. Therefore we have dropped Denmark and its bloc from this analysis.

As the model runs on a different set of economic relations[14], the results are not directly comparable with the input-output analysis above. However, qualitative comparisons can be made, especially between the overall investment scenario and the gendered investment scenario.

The business - as - usual benchmark scenario includes current plans that differ across the countries/blocs studied. For example, the business as usual scenario for the EU countries factors in the EUR 315bn Juncker Investment Plan, so it is not strictly speaking a pure austerity plan, although it assumes fiscal consolidation of current government spending in the short term. Table 16 shows the bloc-specific assumptions of the boost scenarios (overall and gendered) for private investment and government spending, over and above those made for the business as usual benchmark. As the model sets a medium-term target, these figures are not to be understood as exogenous shocks in demand for the economy (as in the analysis above) but as the results of both an initial investment boost carried through year on year and the knock-on effects on growth and thus government spending and private investment further down the line. Hence in 2030, the total share of private investment and government spending as a percentage of GDP is higher than 2% compared to the business as usual scenario, reflecting cumulative effects over the years.[15]

14 Unlike general equilibrium models, as an open disequilibrium system CAM does not assume any single equilibrium path to which the world economy tends to return in the medium or long-term (unlike input-output models implicitly); this means that it can simulate a wide variety of outcomes with different growth rates and end points (Cripps, 2014). In CAM the world economy is modelled as an integrated system in which social and economic variables of different countries and blocs differ. Time-series data taken from the United Nations Statistics Division and the IMF are incorporated in the model and regularly updated (currently 1970-2015).

15 CAM does not work with initial shocks to be put in the model but rather by setting targets to reach (for investment and government spending for example) so there is no distinction between exogenous spending (our 2% GDP carried through year on year) and endogenous spending.

Table 16 Private investment and government spending in 2030 – boost scenarios relative to business as usual

	Target 2030 (% GDP)	
	Private investment	Government spending
Germany	2.92	1.00
UK	2.94	2.00
Eurozone Periphery	2.93	2.48
US	3.68	0.95
Australia / Can.	0.67	0.54
East Asia High Income	0.11	-0.62

Source: calculations by Giovanni Cozzi using CAM (2015)

Table 17 shows the results of the different boost scenarios on employment rates. These figures are in line with the input-output analysis above, as the gendered investment scenario seems to produce better results in terms of total employment rates and reduction of gender employment gaps than the 'overall' investment scenario. Note however that increases in employment observed in 2030 are much smaller than those in the input-output analysis because the CAM model has a supply side that might constraint the effective increased demand for labour. By contrast, the input-output model only provides labour demand estimates, and thus implicitly assumes that any job created will be taken by someone available and with the right set of skills (see Appendix 2).

Albeit with variation between countries that reflects their labour market structure and economic policy priorities, the gendered investment boost scenario shows a total employment effect that is greater than the overall boost scenario (up to twice as large in the Eurozone periphery). Interestingly, not only women's employment rates are raised substantially more in the gendered boost scenario than in the overall boost scenario, but also men's employment rates increase in all blocs to the same extent than in the overall boost scenario.

Photo: ILO

Table 17 Percentage point increase in employment rates in two investment scenarios (2030)

	Total		Women		Men	
	Overall	Gendered	Overall	Gendered	Overall	Gendered
Germany	0.47	0.73	0.21	0.74	0.73	0.72
UK	0.65	0.91	0.31	0.82	1.01	1.02
Eurozone Periphery	0.95	1.94	0.84	2.93	1.04	0.94
US	0.37	0.69	-0.11	0.53	0.86	0.86
Australia / Can.	0.39	0.76	-0.02	0.73	0.81	0.81
East Asia High Income	0.31	0.32	0.11	0.13	0.5	0.51

Source: calculations by Giovanni Cozzi using CAM (2015)

The CAM model also provides estimates of economic growth and public debt over the long term. Table 18 compares the figures for 2015 and 2030 for the business as usual scenario with the investment scenarios. The first two columns show the cumulative effects of GDP in 2030 for the two investment scenarios over and above the effect of the business as usual scenario. For example, the gendered investment scenario in Germany leads to a GDP figure that is 32% higher at the end of the 2015-2030 period than that obtained by a business as usual scenario. Both investment boost scenarios yield similar positive results in all blocs as expected with variations between countries ranging from a 26% boost in the UK to a 56% boost in the US. Differences in cumulative growth between the boost scenarios are only noticeable in the Eurozone periphery where the gendered scenario increases GDP by 5 percentage points more than the overall boost scenario. Government Debt is reduced more as a percentage of GDP by 2030 in the case of the boost scenario (similar figures for both scenarios) than in the case of the business - as - usual scenario. In other words, the investments that characterise the two boost scenarios more than pay for themselves, even using the narrow criterion of their effect on the public finances.

Table 18 Cumulative effects on GDP and government debt (2015-2030)

	GDP growth (% cumul.)		Debt (% GDP)		
	Overall	Gendered	2015	Usual 2030	Boost 2030
Germany	31.76	32.37	71.6	66.6	57.7
UK	26.13	26.19	78.6	75.9	59.0
Eurozone Periphery	27.76	32.68	120.1	105.3	83.4
US	56.01	55.94	93.4	93.2	70.1
Australia / Can.	34.72	34.78	66.9	73.2	56.3
East Asia High Income	29.20	29.50	46.3	43.6	35.4

Source: calculations by Giovanni Cozzi using CAM (2015)

Results from this independent set of simulations confirm the hypotheses outlined above that investing in the economy produces positive results when it comes to economic growth and government debt even if it initially requires additional government spending, ruling out any claim that austerity policies of cutting government spending offer both employment and GDP growth as well as fiscal discipline. Moreover, gendered investment strategies increase total employment more and men's employment in equal measure than non-gendered strategies but at the same time are more effective in reducing gender employment gaps.

Conclusion

This report has shown that policies that are effective in promoting economic growth and employment are likely to be those that include public investment in infrastructure rather than austerity and public spending cuts. However, it is necessary to see infrastructure from a broader point of view than usually portrayed in accounts of Keynesian intervention plans. Social infrastructure, the activities that provide health care, education, childcare and adult long-term care are vital to maintaining and growing the productive capacity of an economy, as well as being essential ways of developing people's quality of life.

In the short-term, our simulations have shown that investing the equivalent of 2% of GDP either in the care industry or in the construction industry generates substantial positive employment and output effects. However investing in care produces larger employment effects in all countries. Not only are more jobs created through direct, indirect and induced effects than by investment in the construction industry, but because more of the jobs that are generated are likely to be taken up by women, such investment helps reduce gender inequalities in employment. We also argue that working conditions would be improved along the way as more jobs become available in care services.

We observe differences in magnitude between countries that are due in part to differences in the structure of labour markets (level of compensation of care workers) and the organisation of the industry (outsourcing and labour intensity depending on the mix between residential or centre-based care and family or at-home care). Even in countries where average compensation of employees in the care industry is close to that of the construction industry (i.e., all countries but the UK and the US), employment effects are larger owing to fewer imports and greater labour intensity in care services.

Although it is likely that in the long-run some of the initial investment will be recouped through improvements in productivity, the permanent nature of the services in care (paying carers' wages every year) will likely require a different funding model than one-off projects such as building roads or houses. However, some of the large physical infrastructure projects tend to have long spans before the product is finished and may require permanent streams of funding too. Taxation should therefore be a key instrument in the design and the implementation of such policies altogether. For care services as well as environmentally-friendly infrastructure, this could take the form of a social contract between generations using general taxation.

Additional analysis using the CAM model has confirmed that economic policies that aim at increasing private investment and public spending are beneficial in the long term, for employment, economic growth and government debt reduction. Moreover investment policies that target female employment in particular, such as investment in care industries, have slightly better results on overall employment, and on reducing gender gaps than more gender-neutral strategies while increasing male employment in equal measure.

Expanding on this research, it would be useful to refine the assumptions for calculating induced effects, as more detailed social accounting matrices can do, or using a full-blown microsimulation model to estimate consumption and employment behaviours in reaction of the initial investment. Also, rather than comparing similar sizes of investment between countries (in our case, 2% of GDP), further investigation could include a more accurate picture of the unmet care needs in different countries for which funding and investment is required, as some countries may be much further away from providing adequately for their population's care needs than other (see Italy versus Denmark for example).

In the end, the argument must be that investing in a caring economy reaches beyond economic and employment benefits, as does investing in sustainable and environmentally-friendly physical infrastructure. Providing high quality care that people need is a sign of a civilised and healthy society and that in itself is a sufficient condition to advocate for public investment in high quality care services. Moreover, both investing in care services and in construction projects satisfying renewable and environmentally-friendly criteria are vital steps in enabling societies to become sustainable. The two types of investment should be considered together. This report suggests that the urgent need to solve the care crisis and address gender inequalities makes investment in the social infrastructure a higher priority than is currently the case. Be that as it may, the results of this analysis and other studies show that, as an effective alternative to austerity, investment in physical infrastructure cannot be presented as the only form of investment that would stimulate employment and economic activity.

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Appendix 1 Country profiles

Australia

System of care provision (care regime)

Australia, an Antipodean "liberal" welfare regime (Esping-Andersen, 1990; Ferragina and Seeleib-Kaiser, 2011), has scant provision of public services, and all benefits are means-tested. However, its social protection system is more comprehensive and inclusive than that of other liberal welfare states (Castles, 1998; Arts and Gelissen, 2002). Because thresholds are relatively high a considerable part of the population receives some means-tested benefits. Income guarantees, employment security and wage controls play a more important role in the state's redistributive efforts than social services.

Long-term care

The federal government is responsible for designing and financing long-term care (LTC) provision for the population over 65 years old (usually referred to as 'aged care' in Australia), and states and territories for planning and monitoring services for those with care needs who are under 65, under the terms of the National Disability Agreement (OECD 2011a). It is estimated that 2.3% of the total population use LTC services (1.6 at home and 0.7 in institutions (OECD 2008)). Nearly all publicly funded provision is delivered by the private sector, often by non-profit organisations. All programmes are tax-funded, but some require co-payments.

Several schemes have been designed to meet the requirements of those with care needs. First, public funding for residential care is means-tested and co-payments by recipients account for approximately 30% of funding. Eligibility is assessed by the Aged Care Assessment Teams (ACATs) and the average subsidy per person in 2009 amounted to AUD 20,000 for those with low care needs and AUD 52,000 for those with high care needs (OECD 2011a). In comparison – the mean disposable household income in 2009-2010 was AUD 44,096 (USD 30,836) annually (ABS, 2013).

Second, non-residential care (Home and Community Care (HACC)) is a programme funded (just under 60%) by the federal government and (just under 40%) by state, territorial or local governments, with co-payments providing up to 5% of funding. This programme includes community nursing, community-based respite care, domestic assistance and personal care, as well as transport and meals. Additional alternative packages are available under HACC: Community Aged Care Packages (CACPs), also available to those approved by ACATs, and subject to means testing are an alternative to low - level residential care and consist of home-care services for elderly people (approximately 5-6 hours of direct assistance weekly). The average subsidy in 2009 was AUD 12,000 per person and 10% was financed from co-payments. The alternative to for those with high care needs is Extended Aged Care at Home (EACH) funded federally. The assistance offered goes beyond CACPs and the subsidy per person amounted to AUD 39,000 in 2009. Finally, special help is offered to people with dementia (Extended Aged Care at Home Dementia (EACHD)). It is similar to EACH but provides specialised services. The direct assistance of 15-20 hours per week attracts a higher subsidy per person annually.

Irrespective of the package granted, the federal government sets the maximum daily payment the service providers can be remunerated. If the individual's expenses exceed the annual threshold the beneficiary qualifies for a 20% tax offset (OECD, 2011a). Overall, government spending on all programmes aimed at providing long-term care services for elderly people amounted to 0.85% of GDP in 2011-12 of which 70% was for residential care (SGRGSP, 2013).

Any care provider needs to meet quality standards supervised and monitored by the Aged Care Standards and Accreditation Agency, which has a formal complaints investigation scheme. In 2007 almost 2% of Australia's labour force worked in the residential and non-residential care sectors, but the majority of LTC services (over 83% in 2003) are still provided informally by family, partners or other personal carers, some of whom receive cash allowances from the government. Faced with rising demand for LTC workers – up to 140% by 2050 (OECD, 2011a) – Australia has introduced immigration programmes for long-term care workers and measures related to skill upgrading, including public funding streams for care workers interested in qualifying for the nursing profession.

Childcare and early education

The Australian pro-market orientation is also visible in its funding of for-profit childcare. Eligible parents of preschool children can choose between day care centres or family day care to receive a means-tested childcare benefit (CCB). There is also a non means-tested childcare rebate that reduces by 50% the out of pocket expenses (after any CCB) up to a ceiling. Budget 2015 recently reformed the funding system by offering, from 2017, a single means-tested payment called childcare subsidy (paid to the provider) of up to 85% of childcare costs for low income families and 50% for middle income families (Families Package 2015). Eligible parents must be in work, looking for employment, training or volunteering for a

specified minimum number of hours per week. Additional assistance is provided to those with children with greater needs and/or in disadvantaged communities. As a result of generous means-testing (and the non-means tested element) the subsidy provided is larger than 50% of the fee, for 95% of children in care. In 2013, about a third of children aged 0-2 were enrolled in formal childcare, compared to two thirds of those aged 3 to 5 (OECD Family database, 2014). In Australia primary education starts at 5 years old.

Funding is a shared responsibility between federal, state and local governments with the federal government contributing 81% of the total. ECEC fee subsidies (including for after-school care) is estimated to amount to about AUD 9bn in 2011. This figure, which includes the cost of primary education funding for 5 - year - olds, represents 0.59% of GDP (OECD SOCX, 2015).

Denmark

System of care provision (care regime)

Denmark, as a Nordic "social-democratic" welfare state (Esping-Andersen, 1999), offers extensive social rights and marginalises the role of private formal welfare provision. The universal rights approach emphasises equality of all citizens, thus provision of a high level of basic security is a central concern. The combined use of in-kind and cash benefits together offer employment and care services allowing both women and men to participate fully in the labour market (Myles, 1998: 344).

Long-term care

Long-term care (LTC) services are provided and financed by local councils (under the Consolidation Act on Social Services (CASS)). Access is equal and free of charge for all legal residents of Denmark irrespective of age, wealth or income. Services are financed through local taxes and block grants from the state (Schulz 2010). Available services comprise conventional nursing homes (rent is paid according to a person's income), subsidised housing for older people with care facilities and care workers, and care at the recipient's home (temporary care has to be paid by the recipient, permanent care is free of charge). The government has explicitly given priority to community care and help for elderly people in their homes over residential care, through offering personal care services and domestic help – shopping, cleaning etc. The aim of providing formal help to all people with critical needs is achieved as it is estimated that almost everyone who has severe impairment receives some formal care, with the remainder either able to cope without help or receiving help from relatives or friends. Among those aged 65+, 94% of the 125,000 individuals who were identified as having severe impairments received formal help in 2010, according to the SHARE survey (Schulz, 2014).

In 2003, following the 'free choice reform', private care providers entered the sector. Thus, individuals and private companies that meet quality standards and municipality price requirements can receive from users a service certificate which allows the municipality to employ them. However, their numbers are still limited and they overwhelmingly provide practical help with instrumental daily activities such as housework and shopping (Schulz, 2014). Local authorities can also grant cash benefits to those with care needs (OECD, 2011a). Together the in-kind and the cash benefits for LTC in Denmark amounted to 4.5% of GDP in 2010 (2.5% on services and 2% on cash transfers), the highest in the OECD (Lipszyc et al., 2012: 11).

Although, as in every other country, the majority of care is still provided unpaid by family, because LTC services are to a large extent institutionalised, publicly funded, available and guaranteed, Denmark has one of the lowest rates of informal caregiving in Europe. Informal carers are nevertheless well supported and can claim a care allowance as compensation for lost wages (OECD, 2011a).

Childcare and early education

This "social-democratic" universalist approach also applies to child care. Denmark has one of the highest proportions of children in state-subsidised child care institutions in Europe. As Wolfe (1989) has argued, the family "goes public" in Denmark and most Danish children spend part of their lives in day care. This universal child care provision was introduced when an alliance of the women's movement with other powerful organisations (e.g., social pedagogues) advocating the ideal of professional care managed to break through a previously prevailing rhetoric of opposition between children's and women's interests (Kremer, 2006).

The thriving development of centre-based child care in Denmark in the 1960s also helped meet the demand for greater employment in a way that corresponded with the emancipatory views of Danish women aspiring to financial independence from their male partners. Instead of relying on immigration, as most Western European countries did to increase their labour force, Denmark employed women already in the country to fill the gaps (Borchorst and Siim, 1987).

Today Denmark has the best-trained child care workers in Europe (Siim, 2000; Borchorst, 2002). It argues that professional care for younger children gives them the 'social pedagogical' attention not available at home and 'focuses not only on individual development but also on becoming a social human being' (Kremer 2006: 266). Child care provision is the responsibility of municipalities, and all children from the age of 26 weeks up until 6 years are entitled to a full-time place in a day care. 91% of children aged 1-2 years (74% of 0-2) and 97% of children aged 3-5 were enrolled in day care in Denmark in 2011 (EC, 2014). Parental payments are earnings-related but capped at 25% of operating costs (EU, 2015). In total Danish public expenditure on childcare and early education services

amounts to almost 1.5% of GDP and is the highest of all the OECD countries (OECD SOCX, 2015).

Germany

System of care provision (care regime)9

Germany is described as having a 'continental-corporatist' welfare regime (Esping-Andersen, 1990; Ferragina and Seeleib-Kaiser, 2011) which means that it diversifies sources of care, relying on different actors and assigning a greater role to the market and occupational group-based social insurance (Degavre and Nyssens, 2012: 23).

Long-term care

In 1995 Germany pioneered a new system of funding long-term care by introducing a system of compulsory long-term care insurance (LTCI) for those below a certain household income level, expanding the universal long-term care (LTC) risk coverage and developing benefit provisions beyond just means-tested public assistance (OECD, 2011a). After assessment of needs by the Medical Review Board (MDK), insured beneficiaries can choose between cash or in-kind benefits or a combination of both. Despite the fact that the value of the cash payments is about half that of in-kind services, the majority of users opt to receive only cash, or a combination of services and money, to compensate family members for their informal care. In-kind care services are almost entirely (97%) provided by private companies and non-governmental organisations, contracted by Long-Term Care Insurance Funds. Likewise, semi-residential care home providers (day care centres and respite care facilities) are private or run by non-profit organisations (over half of all homes) (OECD, 2011a).

Taken together the in-kind and the cash benefits for LTC in Germany amounted to 1.43% of GDP in 2010 (Lipszyc et al., 2012: 11). Eligibility for LTC benefits is based on LTCI contributions from employees and employers for at least 2 years within a period of 10 years prior to application. Approximately 90% of the adult working population is covered.

However, insurance very often does not entirely cover the suggested care package, in which cases either means-tested transfers are provided through social assistance schemes, or the recipients and their family are responsible for paying for the remainder (OECD, 2011a). In addition, the package suggested by insurance funds is focused on para-medical care, rather than on home help which tends to be poorly covered. As in other countries, such as Italy and Spain, beneficiaries of cash allowances often employ home care workers operating in the grey economy. To regularise that situation the government in 2009 introduced financial incentives for standard secure employment, such as tax deductions of 20% of care costs up to EUR 4,000 a year. Some tax deductions are offered also for employment with a lower standard of security (so called "mini-jobs"), and for employment of immigrants on a 24-hour basis for no longer than three months (Degavre and Nyssens, 2012: 40).

Additionally, private insurance for supplementary LTC coverage is available in the market, and it is estimated that 1.58 million people have specific insurance for the remaining LTC costs, insurance that pays a set additional amount for LTC irrespective of actual cost, or use life insurance (OECD, 2011a).

Childcare & early education

German childcare provision has up until recently reflected the conservative welfare state tradition, putting responsibility for childcare primarily within the family and considering the role of formal care as supplementary. In that sense this 'residual' familialistic model for childcare differs from the model for long-term care that has evolved towards a social insurance system. However, following the Barcelona Summit in 2002, where the European Union set a target for 2010 of 33% of formal care coverage for children aged 0-3, and 90% for 3-6 years, public childcare provision was expanded dramatically with massive direct investment by the federal government in new day care places, especially for under two-year-olds (Goerres and Tepe, 2012). As a result 24% of children aged 0-2 were enrolled in formal day care in 2011, up from 10% ten years earlier (OECD Family database, 2014). The government's main rationale was that better public availability of childcare would increase female employment and fertility rates. Since 1 August 2013, every child between the ages of one to school entry age has the legal right to early childhood support in a day care centre or day nursery, and the public subsidy covers about 80% of the cost of a slot. However the 2013 target of reaching 35% coverage was not attained and average coverage remained 10 points below target, with substantial regional variation. Recent empirical evidence showed that fertility rates increased in the counties of West Germany that saw a large increase in childcare coverage (Bauernschuster et al., 2014). Parents can also claim back some of their childcare expenses through a form of tax relief, available to all. And since 2013, cash for childcare was introduced with a low monthly allowance to parents looking after a child at home for up to 36 months (EC, 2014). In total German public expenditure on childcare and early education services amounted to 0.5% of GDP in 2011 (OECD SOCX, 2015).

Italy

System of care provision (care regime)

Italy, which is portrayed as a "familialistic" welfare state (Esping-Andersen, 1990; Ferragina and Seeleib-Kaiser, 2011), relies mostly on family care and financial transfers for care services. With formal home care services relatively underdeveloped, the majority of support is provided through cash allowances.

Long-term care

The main form of social assistance for long-term care (LTC) is through a national disability cash benefit (called Attendance Allowance) that is paid by the National Social Security Institute to all citizens assessed as being unable to perform the basic activities of daily life[16]. This payment is monthly, universal, not restricted by age, and not linked to a means test or to social security contributions. No plan for purchasing LTC services is required to receive the benefit and recipients are free to spend the money as they want (OECD, 2011a). However, formal in-kind provision of care at home is almost non-existent (and that which does consists of mainly residential nursing care). With changing family structure and growing mobility, families increasingly struggled to provide adequate informal care to relatives. As a result, Italy saw an increase in low paid care provided by immigrants (both legal and illegal, and often irregular), a phenomenon that became known as the "migrant in the family" (Knijn and Saraceno, 2009). One estimate puts the proportion of care workers who are foreign-born (circa 2010) at 72% (OECD, 2011a). The Italian government made an attempt to regulate this grey economy by introducing in 2005 a tax benefit for employers (19% of the care-provider salary, but only up to EUR 399 per year) and tax deduction of their social security contributions (of between EUR 356 and EUR 666 per year). The benefits are limited to families that pay taxes whose joint income does not exceed EUR 40,000 per year (Degavre and Nyssens, 2012).

A second allowance, the Care Allowance, is financed by the regions and municipalities and takes the form of a cash payment or a voucher for purchasing home care services. It was introduced in 2000 and resulted in the creation of individual care plans for all care recipients. However, due to poor needs assessment processes and dysfunctional execution and monitoring of care plans, the effectiveness of the allowance is being disputed (Degavre and Nyssens, 2012). Nevertheless, this programme has resulted in the government focusing on the use of 'conditional monetary subsidies' tied to the use of a service.

Together public funding of in-kind LTC provision and cash benefits amounted to 1.9% of GDP in 2010 (Lipszyc et al., 2012: 11).

Childcare and early education

The Italian 'familialistic' type of welfare state also manifests itself in child care, mainly provided informally within the family. This is common practice, especially for very small children, when a grandmother is in good health and lives nearby. Enrolment in formal childcare for children under 3 has traditionally been very low – albeit with large regional variations (Del Boca et al., 2005). From 2007 the government focused on greatly increasing funding for formal childcare to comply with the 2002 Barcelona summit recommendations. By 2011, about 26% of 0-2 year olds were enrolled in day care facilities (EC, 2014). Enrolment for older children aged 3 to 5 has always been much higher, close to 100%, as part of the free pre-primary school system (Scuola materna) (EC, 2014). Existing public child care is well-subsidised and has high quality standards, similar to most Northern European countries. It is highly regulated in terms of opening hours and duration (limited to 7-7.5 hours a day), especially for the care of children under 3. In total Italian public expenditure on childcare and early education services amounted to 0.6% of GDP in 2011 (OECD SOCX, 2015).

Japan

System of care provision (care regime)

Japan, as an East-Asian 'conservative' welfare regime (Esping-Andersen, 1990; Ferragina and Seeleib-Kaiser 2011; Miyamoto, 2003), is characterised by limited social expenditure and relies on the family and local community as primary care providers. It also incorporates elements of a 'liberal' welfare state that gives priority to market mechanisms (Esping-Andersen, 1999).

Long-term care

Japan's long-term care provision faces increasing challenges, with a rapidly ageing population. It already has the highest share of the population aged over 80 among OECD countries, with demand for LTC services projected to double by 2050, while the potential workforce is expected to decline (OECD, 2011a). To tackle the changes, the government introduced in 2000 a Long-Term Care Insurance (LTCI) programme in addition to the compulsory national health care system. It was designed to support beneficiaries' independence and relieve the family of care duties. This system enabled for-profit entities to be subsidised to provide home care services in addition to existing non-profit ones. Residential care remained mainly non-profit.

In spite of the above changes, LTC expenditure in Japan remains below that of the Nordic countries systems – it spent 0.91% of its GDP on long-term nursing care services in 2011 (0.78% on public care and 0.13% on private care) (OECD SOCX, 2015). All LTC services are financed either by taxes collected from various levels of government (45% of the total), by social contributions – paid by those

16 Needs are assessed by Local Health Authorities (ASL) and the National Health Service (SSN) working in multidisciplinary teams. The classification system differs across regions, thus the number of beneficiaries varies. The final decision on granting an allowance is taken by the National Institute of Social Security (INPS) (OECD 2011a).

over 40 based on their incomes (45%) or by direct payment from the beneficiaries (10%) (OECD, 2011a).

Long-term care (LTC) services are available to all citizens over 65 and to people aged between 40 and 64 for illnesses such as Parkinson's, pre-senile dementia or stroke. Local government assesses a person's care needs and provides a personal LTC plan designed and organised by a "care manager". LTC insurance covers 90% of the cost of the services regardless of the type of provider (institution, community-based or at home) as long as they are certified (OECD, 2011a). To become a certified LTC worker a person has to obtain minimum training qualifications, depending on the service provided. Formal caregivers are protected under the Labour Standards Act, and are therefore entitled to benefits such as annual paid leave, maternity leave or child care leave, and workers' accident compensation. Additionally, they are offered training, counselling and post-care employment assistance by municipalities.

Childcare and early education

Japan has one of the lowest fertility rates (1.37 in 2009) in the world. To change this situation the government has made some efforts over the last decade to 'defamilialise' childcare and has introduced pro-natalist policy reforms (Soma and Yamashita, 2011).

Japan provides two types of formal care - kindergartens (school-based and usually for 3-5 year olds) and child day care facilities (welfare based and for children aged 0-5). In total, 9 out of 10 children aged 3 to 5 were enrolled in childcare facilities (Soma and Yamashita, 2011). Kindergartens attracted 56% of children enrolled in formal childcare in 2008, 80% of whom were in privately-run facilities (NIER, 2011). Day care centres can be licensed and operated by public or private sector organisations, or non-licensed and operated at home. They offer care also for children under 3 years old (26% enrolment rate in 2011). 54% of children aged 0-5 enrolled in day-care centres attended private facilities in 2008 (NIER, 2011). In 2000, the government introduced the Social Welfare Law that deregulated child care and allowed private sector child care facilities to grow. Some local governments cut their care budgets or privatised their day care centres in an attempt to bridge their fiscal deficits. This change was described as the withdrawal of the public sector from the primary provision of welfare services and a reduction in quality of care. Since then centres not previously approved as care providers by the authorities, as well as non-profit organisations, have become a viable alternative. This turn "from state to market" locates Japan closer to the 'liberal' welfare regimes. By 2011, total public expenditure on childcare and early education services was 0.13% of GDP, the lowest in the OECD countries studied (OECD SOCX, 2015).

United Kingdom

System of care provision (care regime)

The United Kingdom is defined as a 'liberal' welfare state (Esping-Andersen, 1990; Ferragina and Seeleib-Kaiser, 2011) and, according to this typology, acknowledges market dominance and does not engage significantly in public social and welfare provision, instead providing for basic needs on a means-tested basis. The UK is often classified as a liberal welfare state with a medium level of social stratification of provision, mainly because of its National Health Service (NHS), which provides in-kind transfers that are free at the point of use (Arts and Gelissen, 2002: 146). The administration and part of the funding of long term care and childcare services are devolved to the four nations of the UK, with slightly different levels of public funding, especially in Scotland.

Long-term care

The United Kingdom has introduced major reforms to long-term care (LTC) over the last 20 years in order to contain the costs of meeting the changing and increasing needs of its population. Since 1993, when major reforms to the social care system were carried out in England, dependent older people have been supported by means-tested locally run social care services and disability-related centrally administered social security benefits (Degavre and Nyssens, 2012: 34). The main role of local authorities has been to assess the needs of individuals, commission services and oversee the work of the local care quasi-markets (Malley et al., 2010). These markets are highly competitive (thus, there is a risk that price competition results in multiple providers engaging in a race 'to the bottom' in terms of quality through reducing remuneration for care workers) and at the same time highly regulated, standardised and supervised by national bodies (e.g., the Care Quality Commission).

There is a definite trend towards a 'personalisation agenda' to be delivered through a consumer-directed care model (Fernández et al., 2007) of means-tested cash benefits to purchase social and personal care services (Direct Payments introduced in 1997). Currently these are in addition to the remaining in-kind care services (mainly health-related nursing interventions), but further encroachment of Direct Payments into the Health Service is planned. Personal Budgets are becoming universal, but those who do not want to manage their own budgets can hand over the management of their budget to a third party (family, friends or the local authority). These payments have increased the shift away from formal, regulated professional care service provision towards unregulated informal carers, paid or unpaid, who despite emotional commitment, may lack necessary expertise (Lewis and Hobson, 1997; Pavolini and Ranci, 2008; Rostgaard, 2011).

In Scotland, social care is provided free of charge for all those aged 65 or more who need it (over and above existing cash benefits). Care in residential facilities is also free

but recipients have to pay for their accommodation cost (with means-tested support for low income people).

There is also income support available in all the UK nations for those in need of long-term care or their carers. Attendance Allowance (for those above 65) or Personal Independence Payment (for those aged 16-64, with increasingly strict eligibility conditions for those who can prove they are not fit for employment) are both flat-rate universal benefits. Severe Disability Premium, a top-up to the means-tested Pension Credit is also available for the severely disabled, as is the Carer's Allowance, for those who care full-time for a relative. Except for in Scotland, these allowances reflect the emphasis on direct cash transfers to pay for private care of the beneficiary's choice rather than subsidising the direct provision of services (Degavre and Nyssens, 2012: 35). For the UK as a whole, public in-kind LTC services amounted to 1.42% of GDP and cash benefits to 0.56% of GDP in 2010 (Lipszyc et al., 2012: 11).

Childcare and early education

In keeping with its liberal tradition, the UK has promoted private provision of childcare, either by the family or the market (for or not for profit). However, successive governments have increased the financial support available for parents of pre-school children over the last 15 years with the introduction in 2003 of childcare tax credits for families on low income and entitlement to some free childcare for 3 and 4-year-olds (later expanded to 15h per week and also to disadvantaged 2 year olds, with recent plans to increase hours to 30). Despite this, provision remains below demand and costs have been rising constantly with no sign of abating as increasing eligibility for subsidies fuels demand. This has led to price rises without attracting more provision because the level at which subsidies are paid has not risen in line with actual running costs. Use is also very unequal according to income with lower to middle income families reporting least access to affordable childcare (Van Lancker, 2013). Despite rising enrolment of young children in formal childcare, most attend day care facilities part-time, reflected in the high level of mothers' part-time employment. In 2011, about 35% of children under 3 attended formal childcare, but for an average of only 14 hours per week. The same holds for older children: although 90% of 3-5 year olds were formally enrolled, the average number of hours in childcare and pre-primary education was 20 per week (EC, 2014).

Families pay directly to the care provider. A recent reform is introducing a "tax-free" childcare scheme to replace the existing employer-based childcare voucher. The scheme to be rolled in from 2017 will pay for 20% of the cost of childcare, up to an annual limit per child, and will be available to employed parents who are not receiving tax credits.

In total the UK's public expenditure on childcare and early education services is around 0.4% of GDP, in the form of the three main subsidies available (childcare tax credit, voucher/tax-free childcare, and free entitlement to pre-school education), and hasn't changed much since 2010 (EC, 2014; Emmerson et al., 2015). However, since children enter primary education when 5 years old, total public spending on ECEC includes their first year, and was estimated to be 0.8% of GDP in 2011 (OECD SOCX, 2015).

United States

System of care provision (care regime)

The US has a 'liberal' welfare system (Esping-Andersen, 1990; Ferragina and Seeleib-Kaiser, 2011). Since the 1970s this has been called a 'workfare' system, where social insurance benefits are modest and means-tested, and citizens are urged to provide for their own welfare in the market, by paying for private insurance or employer-based benefits with their own incomes and earnings (Myles, 1998: 344).

Long-term care

Publicly funded long-term care (LTC) services are, as in England, targeted at people with low income. They are provided as a safety-net programme as a part of Medicaid. Medicaid is the primary funder of LTC, and is organised by the federal government, but states are responsible for its implementation. As a means-tested programme it is designed to help people with limited income to pay for medical expenses. It allows beneficiaries to choose a provider of home health care aid service or a doctor and delivers institutional nursing facility services. Only limited facility-based programmes are available for those who need assistance at home to live independently. Medicaid programmes are granted only as a last resort. In order to become an eligible person, an applicant must exhaust or "spend down" personal resources first. In some states beneficiaries have to contribute and make small co-payments (OECD, 2011a). Another programme, Medicare, is run by the federal government for older people and aims to cover hospital visits, specialist appointments and health care costs, i.e., hospice care and doctors' visits during hospitalisation. It does not cover any LTC services.

At the same time the US has one of the most developed markets for private insurance for people with higher incomes and accumulated assets. Although only 5% of the population over 40 is covered, the largest total payment for LTC comes from private contributions and out-of-pocket payments. Residential LTC is divided between facilities accepting Medicaid beneficiaries and privately funded ones that do not. Both kinds of service providers have to meet legal standards to operate. There is a great deal of variation in the intensity of care provided, as well as in its character (some do not include medical assistance) and price. By contrast home and community-based services (HCBS) are mostly provided by family or friends, with additional medical services provided by doctors. In some communities Adult Day Care Programs (ADC) or senior

centres have been established for the elderly during the day. Social workers provide some help with meeting daily needs, but meals provision and help with transportation are organised by private agencies (OECD, 2011a).

The introduction of a new voluntarily, publicly managed LTC insurance programme, called Community Living Assistance Services and Supports (CLASS), has been discussed for some years. According to this proposal, a monthly premium would be deducted via the payroll for enrolled persons to provide cover on a guaranteed-issue basis. They would become entitled to life-time cash benefits if they met eligibility criteria (based on degree of impairment), and had five years of contributions to the system and had worked at least three of those years (CLASS, 2010). However, in October 2011 the US administration decided to abandon it as "unworkable". In 2010, the Patient Protection and Affordable Care Act (ACA or Obamacare) was introduced. Its aim was to increase the quality and affordability of health insurance and lower the proportion of uninsured people (which reached 17% of the population in 2006). The Congressional Budget Office projected that the ACA would lower Medicare spending in the future (CBO, 2011), which might improve the chances of introducing CLASS.

Childcare and early education

The 'liberal' approach to child care in the US can be observed in the arguments used by the government to justify its subsidies and welfare programmes. They are based on three claims: improving equity - to give children the same opportunities to fulfil their potential, which is in line with the "American dream" narrative; second, encouraging parents to work — to make them employed and self-sufficient instead of enrolled in welfare; and third, addressing childcare market imperfections – if the social and intellectual development of a child can be improved and beneficial to society in the future, the subsidies are justified (Duncan and Giles, 1996).

In 1996 four different child care subsidy programmes for low income families were replaced by the single block grant – the Child Care and Development Fund (CCDF). The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) increased funding for child care and enabled states to set the subsidy programme rules as well as giving them choice in transferring up to 30% of the funds from the cash grant welfare programme (Temporary Assistance for Needy Families - TANF) into the CCDF and to spend that money directly on child care (Blau and Tekin, 2005). In 1999 all the CCDF allocation, of about USD 5 billion, and an additional USD 4 billion from the TANF block grant was spent on child care (Blank, 2002). To be eligible for subsidy parents must be employed, in school or in training and their children must be under the age of 13 (the cut-off age for eligibility for CCDF subsidies). Priority for funds is given to families with very low incomes who are not recently, currently, or likely future welfare recipients and to families with children with special needs. Still, most households receiving cash transfers from public assistance programmes are headed by single mothers (over 90% of TANF cases with an adult recipient in 1998) (Committee on Ways and Means, 2000: 437; Blau and Tekin, 2005).

In 2012, 26% of children under 3 and 70% of children aged 3-5 were enrolled in formal childcare facilities (US Census Bureau, 2015). Typical childcare fees are amongst the highest in OECD countries, even accounting for cash or tax subsidies (almost non-existent in the US) (OECD Family database, 2014). In total US public expenditure on childcare and early education services was 0.37% of GDP in 2011 (OECD SOCX, 2015).

Care Economy, who cares?

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Appendix 2 simulation methodology

General method

This analysis uses official input-output tables produced by national statistical offices to calculate the full employment effects of additional demand, created for example by government spending, for the products of a particular industry. The methodology used is well-known. In this analysis we have followed closely the methods used by the Scottish government's statistical office (see Scottish Government (2015), referred to below as the "Scottish methodology notes").

This is how the different ways in which employment is generated is explained:

If there is an increase in final demand for a particular product, we can assume that there will be an increase in the output of that product, as producers react to meet the increased demand; this is the **direct effect**. As these producers increase their output, there will also be an increase in demand on their suppliers and so on down the supply chain; this is the indirect effect (also called Type I). As a result of the direct and **indirect effects,** the level of household income throughout the economy will increase as a result of increased employment. A proportion of this increased income will be re-spent on final goods and services: this is the **induced effect** (also called Type II).

[http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Mulitipliers](emphasis added)

In this research we are interested in **employment effects** and we find these by calculating the total direct, indirect and induced employment changes due to a unit increase in final demand. We also calculate the direct, indirect and induced employment effects separately. We can then multiply any suggested additional demand by the total employment effect, or any component of it, to calculate the amount of additional employment generated.

Type I employment effects (indirect)

1) The process starts with published symmetric tables, giving the quantity of output of industry used directly in industry (where and are industry rows and columns respectively, with rows showing supply and columns use):

1. These tables also include rows for imports and for gross value added by industry, so that the column totals give the total output of each industry.
2. They also include columns for the composition of final demand, from government, consumers (households), gross capital formation and exports.
3. Such tables are produced by national statistical offices, but some provide product-by-product tables (P x P) instead of industry by industry (I x I). The methodology used subsequently is unchanged, with the results needing to be interpreted in terms of products rather than industries.
4. See Scottish methodological notes for an explanation of how they derive symmetric tables, which is not entirely straightforward. Slightly different assumptions are made by each statistical office.

2) Calculate from the symmetric table, or find also from the statistical office, the direct requirements matrix, **A** , whose cells gives the amount of the product of industry *i* needed **directly** to produce a unit of the product of industry *j*,

- W_j the total output of industry, is calculated as the total of the th column of the symmetric table.
- The direct requirements matrix, A, is calculated from the symmetric table by dividing each cell by its column total.

3) Calculate from the direct requirements matrix, or find also from the statistical office, the Leontief inverse matrix or 'total requirement' matrix,**L**, whose elements capture the whole supply chain and give the **total** amount of the product of industry needed **directly and indirectly** to produce a unit of the product of industry *J*.

- The total requirement matrix,**L**, is calculated from the direct requirement matrix, by $\mathbf{L = I + A + A^2 + A^3 + \ldots = (I - A)^{-1}}$, where **I** is the identity matrix.
- The Type I output multiplier for industry *j* is equal to $\mathbf{\Sigma_i L_{IJ}}$.

4) From published figures on employment by industry, calculate the direct employment vector, ***w***, whose components *w* give the **employment directly** required to produce a unit of the product of industry *j*.

- w_j is calculated as employment in industry *j* divided by its total output *Y*. This can be headcount or FTE.
- Similarly a vector recording gender-specific employment by industry can be calculated we used the proportion of women employed). Again this can be headcount or FTE.
- Note that FTE numbers and the gender breakdown of employment were not always available for industries categorised as in the I-O tables. If the employment data were less disaggregated, e.g., in Australia, the same

gender breakdown was applied to all sub-divisions. Where the employment data were more or differently disaggregated, e.g., for government sectors of the US, the gender breakdown was fine-tuned for each industry by using other sources on a case-by-case basis.

5) Employment effects (and corresponding gendered employment effects) for each industry j are calculated as follows:

- The **direct effect** is w_j, the direct labour needed to produce a unit of output of industry *j.*
- The **total Type I effect** (direct plus indirect) is $\mathbf{\Sigma}_i\ w_i\ \mathbf{L}_{ij}$, the sum of all the labour required directly and indirectly to produce an additional unit of output of industry *j.*
- The **indirect effect** is calculated as the difference between the total Type I and the direct effect $\mathbf{\Sigma}_i\ w_i\ \mathbf{L}_i - w_j$ which gives the labour required indirectly to produce a unit of output of industry *j.*

6) The employment multiplier(s), the ratio of indirect to direct effects, can then be calculated (including by gender, FTE etc.).

7) Effects on employment rate(s) can also be calculated.

- The percentage points rise in the employment rate (by gender) equals the total employment effect divided by the working age population (of that gender).

Type II employment effects (induced)

1) For type II effects, we augment the direct requirements matrix A by adding the household sector. Using data from the symmetric table, we add a column to matrix A that gives the composition of consumer demand by industry per unit of household income and a row that gives compensation of employees (and ideally also including income from self-employment but not profits) per unit of output of each industry.

2) The additional column of consumer demand by industry is derived from the corresponding column of the symmetric table divided by total household income. The latter can usually be found in the National Accounts (household sector) data. Where household income is not directly available, we used the total household expenditure divided by (1 - gross saving ratio).

- The sector of households usually includes non-profit institutions serving households (unless separated) and no adjustment has been made to account for this category

3) Calculations are then the same as before, creating an augmented type II Leontief inverse matrix, $\mathbf{L}^i$, and using that to calculate:

- The **total Type II effect** (direct plus indirect plus induced) is $\mathbf{\Sigma}_i\ w_i\ \mathbf{L}_{ij}$, the sum of all the additional labour required, directly, indirectly and induced, when an additional unit of output of industry is produced.
- The **induced effect** is calculated as $\mathbf{\Sigma}_i\ w_i\ \mathbf{L}_{ij} - \mathbf{\Sigma}_i\ w_i\ \mathbf{L}_{ij}$ the difference between the total Type II and total Type I effects. This gives the employment induced by additional household consumption when an additional unit of output of industry is produced.

Some caveats

Some statistical offices calculate such employment effects themselves, but many do not, although they provide the input-output tables and other data needed for their calculation. One reason some do not is that the derivation of employment effects involves making some quite strong assumptions.

Below we list the assumptions that are most relevant to our analysis and, where we can, say the likely effects of them not holding.

1. **Available supply.** It is assumed that the economy has no supply-side constraints, that is, that any additional inputs required, including labour, can be found or produced without taking resources away from existing activities. If this is not the case, then employment effects will be overstated. Actual employment effects are likely to be dependent on the extent to which the economy is operating at or near full capacity or whether there is unemployment.
2. **No effects on wage or price levels.** If there are any constraints on the availability of inputs, such as skilled labour, wages and prices would be expected to rise, and therefore to reduce the quantity that any given amount of expenditure can purchase. Such 'crowding out' effects are assumed not to occur. For this reason, especially where there are skill or other labour shortages, employment effects may be overestimated
3. **No change in methods of production.** It is assumed that additional demand does not lead to a change in how industries produce their output and therefore their input requirements (and how these are sourced). This may not hold where there are fixed capital requirements, economies of scale or a range of ways of producing the same output. If this assumption does not hold, but the previous two assumptions still did, employment effects might be over or underestimated.
4. **All households spend in the same way and continue to do so.** In calculating induced effects, final demand from households is assumed to retain its existing composition and simply rises or falls in proportion to household income. If additional employment leads households to save more, this assumption does not hold and employment effects are likely to be slightly exaggerated. Further this assumption will not hold if any additional income generated through employment goes to households whose spending patterns differ systematically from the average, though without investigating the spending patterns of different types of households, we cannot know whether this would lead to over or underestimation of employment effects.

See Paul Gretton (2013) for a more complete analysis of the assumptions and potential pitfalls of this sort of analysis.

Appendix 3 Data sources and classification

Data sources

Australia	Australian Bureau of Statistics
Denmark	Statistics Denmark database
Germany	Eurostat
Italy	Eurostat
UK	Eurostat ONS
Japan	Statistics Japan
US	Bureau of Economic Analysis Bureau of Labor Statistics

Classifications of industries

Country classification of industries used in their Input-Output tables differ but are broadly in line with the international standard classification (NACE – Rev2), used in the Eurostat tables (and in Denmark).[17]

Europe

The differences between Denmark and the other three European countries are mainly to do with level of aggregation of industries. Denmark provides tables using 117 industry divisions (NACE 3 digit) whereas Eurostat provides tables using only 64 industries (NACE 2 digit).

Statistics Denmark distinguishes between industries 87 and 88 whereas Eurostat (for Italy, Germany and the UK) doesn't.

Division 87, "residential care activities", in NACE rev2, is composed of the following categories:

87.1	Residential nursing care activities	Nursing care facilities
87.2	Residential care activities for mental retardation, mental health and substance abuse	Provision of residential care and treatment for patients with mental health and substance abuse illnesses by paramedical staff and social workers
87.3	Residential care activities for the elderly and disabled	Provision of residential care and treatment for elderly and disabled by paramedical staff and social workers
87.9	Other residential care activities	Social work activities provided on a round-the-clock basis directed to provide social assistance to children and special categories of persons with some limits on ability for self-care (except elderly, disabled and persons with mental retardation)

Division 88, "social work activities without accommodation", includes the following categories:

88.1	Social work activities without accommodation for the elderly and disabled	Social, counselling, welfare, referral and similar services which are aimed at the elderly and disabled, without accommodation
88.91	Child day-care activities	Child day-care activities
88.99	Other social work activities without accommodation n.e.c.	Other social work activities without accommodation n.e.c. Charitable activities like fund-raising or other supporting activities aimed at social work

For the construction sector (sector F of NACE 1 digit), again Statistics Denmark distinguishes between its three different divisions, whereas Eurostat aggregates all of them. Sector F includes the complete construction of residential and non-residential buildings (division 41), the complete

17 See explanatory notes and list of industries by level of detail at http://ec.europa.eu/eurostat/documents/1965800/1978839/NACE_rev2_explanatory_notes_EN.pdf/b09f2cb4-5dac-4118-9164-bcc39b791ef5

construction of civil engineering works (division 42), as well as specialised construction activities, if carried out only as a part of the construction process (division 43), which includes maintenance and repair (e.g., plumbing, plastering etc.). Division 41 is used in our simulations.

US

The US categories are based on the North American classification (NAICS).

See details: https://www.census.gov/eos/www/naics/2012NAICS/2012_Definition_File.pdf

The construction sector (sector 23) is the aggregate of the following categories:

230301	Nonresidential maintenance and repair
230302	Residential maintenance and repair
233210	Health care structures
233230	Manufacturing structures
233240	Power and communication structures
233262	Educational and vocational structures
233293	Highways and streets
2332A0	Commercial structures, including farm structures
2332B0	Other nonresidential structures
233411	Single-family residential structures
233412	Multifamily residential structures
2334A0	Other residential structures

The nursing and residential care facilities industry (623) is the aggregate of the following categories:

6231	Nursing care facilities (skilled nursing facilities)
6232	Residential intellectual and developmental disability, mental health, and substance abuse facilities
6233	Continuing care retirement communities and assisted living facilities for the elderly
6239	Other residential care facilities

The social assistance industry (624) comprises the following:

6241	Individual and family services
6242	Community food and housing, and emergency and other relief services
6243	Vocational rehabilitation services
6244	Child day care services

However, social care provided in people's homes, which is included in NACE rev 2 division 88 above for European countries, is not part of the same classification in the US, since it is included in 'medical ambulatory services'. Indeed home health care services (6216), part of industry 621 (Ambulatory Health services) in the input-output tables, sits alongside other medical services provided outside hospitals. It is described as follows:

This industry comprises establishments primarily engaged in providing skilled nursing services in the home, along with a range of the following: personal care services; homemaker and companion services; physical therapy; medical social services; medications; medical equipment and supplies; counselling; 24-hour home care; occupation and vocational therapy; dietary and nutritional services; speech therapy; audiology; and high-tech care, such as intravenous therapy.

Japan

See note: http://www.soumu.go.jp/english/dgpp_ss/seido/sangyo/san07-3.htm

For the purpose of the input-output analysis, Japan uses a different classification than its Japan Standard Industrial Classification, with the main categories of interest shown in the tables below

For constructions:

4111	-011	Residential construction (wooden)	**411**	Building construction
4111	-021	Residential construction (non-wooden)		
4112	-011	Non-residential construction (wooden)		
4112	-021	Non-residential construction (non-wooden)		
4121	-011	Repair of construction	**412**	Repair of construction
4131	-011	Public construction of roads	**413**	Public construction
4131	-021	Public construction of rivers, drainages and miscellaneous public construction		
4131	-031	Agricultural public construction		
4191	-011	Railway construction	**419**	Miscellaneous civil engineering and construction
4191	-021	Electric power facilities construction		
4191	-031	Telecommunication facilities construction		
4191	-099	Miscellaneous civil engineering and construction		

There is no explicit detail of how the two industries of social insurance and welfare and nursing care used in the input-output tables were constructed from the standard classification shown in the list below. Presumably, sectors 851-53 are likely to be included in the social insurance and welfare industry (643) and 854 could provide the bulk of industry 644 nursing care. However, the correspondence between residential care and non-residential care is not easy, since sector 854 also includes 8544 "home visit care services" for example. The main distinction is between 853, which provides care for children, and 854 and 855, which provide care for the elderly and for the disabled respectively, residentially or not.

See detailed explanation here: http://www.soumu.go.jp/main_content/000323828.pdf

85 SOCIAL INSURANCE, SOCIAL WELFARE AND CARE SERVICES

850 ESTABLISHMENTS ENGAGED IN ADMINISTRATIVE OR ANCILLARY ECONOMIC ACTIVITIES

8500 Head offices primarily engaged in managerial operations

8509 Miscellaneous establishments engaged in administrative or ancillary economic activities

851 SOCIAL INSURANCE ORGANISATIONS

852 WELFARE OFFICES

853 CHILD WELFARE SERVICES

8531 Day nursery

8539 Miscellaneous child welfare services

854 WELFARE SERVICES FOR THE AGED AND CARE SERVICES

8541 Special nursing homes for the elderly

8542 Health care facilities for the elderly requiring long-term care

8543 Day care short stay services for the aged

8544 Home-visit care services

8545 Group homes for the elderly with dementia

8546 Fee charging homes for the aged

8549 Miscellaneous welfare services for the aged and care services

855 WELFARE SERVICES FOR DISABLED PERSONS

8551 Residence support services

8559 Miscellaneous welfare services for disabled persons

859 MISCELLANEOUS SOCIAL INSURANCE, SOCIAL WELFARE AND CARE SERVICES

8591 Offender rehabilitation services

8599 Miscellaneous social insurance, social welfare and care services

Taken from http://www.soumu.go.jp/english/dgpp_ss/seido/sangyo/san13-3a.htm#p

Australia

Australia uses the Australian and New Zealand Standard Industrial Classification (rev 2006) ANZSIC.

For the construction division, four groups are distinguished and are broadly in line with the NACE rev divisions with residential building (although distinguished in the Australian classification from non-residential building), heavy engineering and civil construction, and construction services, which include all the preparatory works, installation (plumbing etc.) and repair, as in NACE division 43.

With respect to healthcare and social assistance services (division Q), Australian input-output tables distinguish the following subdivisions:

Health care services (subdivision 84, hospitals, and 85, medical services).

Residential care and social assistance (subdivision 86, residential care, and 87, social assistance, the latter including 8701, child day care services, which excludes preschool education, similar to the other countries' treatment of preschool education).

See details here: http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/5718D13F2E345B57CA257B9500176C8F/$File/12920_2006.pdf

Overview of occupational composition of care services

Japan

The **social insurance and welfare** sector is dominated by five occupations (97% of total):

- Childcare workers (34%)
- 0527102 Home visiting care workers (27%)
- 0527101 Care workers in medical and welfare facilities (16%)
- General clerical workers (14%)
- Other social welfare specialists (other than childcare workers) (8%)

The **nursing care sector** is concentrated as follows:

- 0206000 Healthcare professionals (34%) of whom more than half are 0206026 nurses (20% of total)
- 0207037 Social welfare specialists professionals (other than childcare) (8%)
- 0527101 Care workers in medical and welfare facilities (44%)

Note that in the Japanese classification of occupations, childcare workers and kindergarten teachers are classified as professionals whereas care workers and home

visiting care workers are in service workers occupations (with hairdressers, bartenders and travel guides) (SOC Rev 5 2009).

US

623 – Residential care is mainly composed of:

- 21 Community and social service occupations (social workers, counsellors, etc.) (6%)
- 29 Health practitioners and technicians (17%)
  - 291141 Registered nurses (6%)
  - 292061 Vocational nurses (8%)
- 31 Healthcare support (34%)
  - 311011 Home health aides (7%)
  - 311014 Nursing assistants (25%)
- 35 Food preparation and related (10%)
- 39 Personal and care services (14%)
  - 399021 Personal care aides (9%)

624 – Social assistance is mainly composed of:

- 21 Community and social service occ. (16%)
- 25 Educational occ. (16%)
  -252010 Preschool and kindergarten teachers (9%)
- 31 Healthcare support (7%)
  - 311011 Home health aides (5%)
- 39 Personal and care services (35%)
  - 399011 Childcare workers (11%)
  - 399021 Personal care aides (20%)

Australia

In Australia, the three main care occupations are:

- **4211 child carers:** provide care and supervision for children in residential homes and non-residential childcare centres
- **4231 aged and disabled carers:** provide general household assistance, emotional support, care and companionship for aged and disabled persons in their own homes
- **4233 nursing support and personal care workers:** provide assistance, support and direct care to patients in a variety of health, welfare and community settings

(No statistics on distribution of these occupations by industry)

Europe

The main care occupations within ISCO-2008 are grouped in category 53 (ISCO 2 digit) within ISCO 1 digit group 5 of services and sales workers and sit along with personal services workers (51)such as waiters and hairdressers, sales workers (52), and protective services workers (54).

Category 53 is composed of the following sub-groups:

- 531 Child care workers and teachers aides
- 5311 Child care workers
- 5312 Teachers aides
- 532 Personal care workers in health services
- 5321 Health care assistants
- 5322 Home-based personal care workers
- 5329 Personal care workers in health services not elsewhere classified

Denmark has employment and earnings data for each of these detailed occupations. Italy and Germany do not.

The UK does not have it either when using ISCO but has a different classification used in its more detailed national earnings and employment data.

UK

The UK uses a slightly different classification (SOC 2010) for its national employment and earnings data with the following categories:

Within the main occupational category 6 of Caring, leisure and other services occupations, the following highlighted occupations are relevant:

612 Childcare and related personal services
6121 Nursery nurses and assistants
6122 Childminders and related occupations
6123 Playworkers
6125 Teaching assistants
6126 Educational support assistants

And

614 Caring personal services
6141 Nursing auxiliaries and assistants
6142 Ambulance staff (excluding paramedics)
6143 Dental nurses
6144 Houseparents and residential wardens
6145 Care workers and home carers
6146 Senior care workers
6147 Care escorts
6148 Undertakers, mortuary and crematorium assistants

Appendix 4 Earnings in different care occupations

UK (2014)

	Total	Men			Women		
	Total in employment (000)	Number (000)	% PT	Mean weekly earnings (£)	Number (000)	% PT	Mean weekly earnings (£)
Total [2]	**30,537**	**16,347**	**12.7%**	**605.20**	**14,190**	**42.4%**	**394.80**
Benchmark							
2231 Nurses	590	68	13.3%	622.70	522	34.1%	515.00
2315 Primary and nursery education teaching professionals	431	51	10.5%	639.60	381	28.9%	566.20
Care occupations							
612 Childcare and related personal services	829	46	28.1%	243.90	783	47.8%	224.80
6121 Nursery nurses and assistants	174	0	-	291.00	171	41.8%	232.20
6122 Childminders and related occupations	129	0	-	139.20	129	38.4%	254.00
6123 Playworkers	34	0	-	127.90	30	77.7%	138.30
6125 Teaching assistants	356	28	31.9%	255.80	328	52.2%	230.80
6126 Educational support assistants	136	11	0.0%	255.10	125	44.9%	220.90
614 Caring personal services	1,309	242	21.5%	323.20	1,067	43.8%	266.90
6141 Nursing auxiliaries and assistants	300	62	15.3%	341.70	238	44.7%	295.40
6145 Care workers and home carers	792	132	27.5%	294.70	660	44.8%	245.00
6146 Senior care workers	72	13	0.0%	377.90	59	28.0%	323.90

Note: Mean earnings are for employees only (from ASHE, 2014). Median earnings not reliable for small occupations. Population in employment include both employees and self-employed (ONS Labour Force Survey 2014)

Denmark (2013)

	Total			Men			Women		
	Hourly earnings (DKK)	Monthly earnings (DKK)	Full-time employees	Hourly earnings (DKK)	Monthly earnings (DKK)	Full-time employees	Hourly earnings (DKK)	Monthly earnings (DKK)	Full-time employees
All occupations	**290.87**	**38,525**	**1,428,117**	**309.21**	**41,400**	**704,568**	**270.72**	**35,368**	**723,548**
Benchmark									
2221 Nursing professionals	293.11	37,529	49,063	306.75	40,288	2,134	292.46	37,397	46,929
2341 Primary school teachers	292.7	38,146	57,908	294.97	38,963	18,560	291.57	37,742	39,348
Caring occupations									
53 Personal care workers	219.03	28,138	141,501	206.76	27,016	21,285	221.31	28,347	120,216
531 Child care workers and teachers aides	199.51	25,688	44,352	189.15	24,689	9,279	202.38	25,965	35,073
5311 Child care workers	199.45	25,680	44,319	188.95	24,662	9,256	202.35	25,961	35,064
532 Personal care workers in health services	228.12	29,280	97,149	220.57	28,841	12,006	229.24	29,344	85,143
5321 Health care assistants	241.39	30,924	45,009	235.32	30,696	6,761	242.51	30,966	38,248
5322 Home-based personal care workers	219.14	28,153	45,329	204.63	26,910	4,381	220.8	28,295	40,949
5329 Personal care workers in health services not elsewhere classified	237.28	31,561	1,384	210.66	28,302	180	241.77	32,111	1,204

Note: data are for full-time employees only (source StatBank from Statistics Denmark http://www.statbank.dk/statbank5a/default.asp?w=1280)

Australia (2014)

	Men	Women	Total
	AVERAGE WEEKLY TOTAL CASH EARNINGS (AU$)		
All occupations	1,429.80	940.20	1,182.40
Benchmark			
2411 Early childhood (pre-primary school) teachers	797.50	1,073.00	1,070.20
2412 Primary school teachers	1,378.00	1,263.80	1,279.20
2544 Registered nurses	1,553.00	1,191.40	1,220.10
Care occupations			
4211 Child carers	397.50	543.30	536.90
4231 Aged and disabled carers	728.40	667.50	679.00
4233 Nursing support and personal care workers	856.10	651.20	695.80

All employees,

2014 Source: Australian Bureau of Statistics - 63060DO011_201405 Employee Earnings and Hours, Australia, May 2014

US (2014)

	All industries		61 Education		623 Residential care		624 Social assistance	
	Employment (000)	Hourly median wage ($)	Employment (000)	Hourly median wage ($)	Employment (000)	Hourly median wage ($)	Employment (000)	Hourly median wage ($)
All occupations	135,128	17.09	12,759	21.51	3,258	12.7	2,768	11.61
Benchmark								
Elementary and middle school teachers (252020)	1,998	27.44	1,983	27.46		-	1	20.51
Registered nurses (291141)	2,687	32.04	73	27.72	195	28.77	22	27.97
Care occupations								
Preschool and kindergarten teachers (252010)	511	16.39	228	23.23		-	252	12.51
Home health aides (311011)	799	10.28	0	10.75	238	10.41	151	10.05
Nursing assistants (311014)	1,428	12.07	8	13.42	804	11.55	26	10.51
Childcare workers (399011)	583	9.48	132	11	28	11.34	316	9.19
Personal care aides (399021)	1,257	9.83	4	11.9	295	10.26	550	9.98

Notes: wages for school teachers are only available annually so the figure is the mean hourly wage assuming 2080h annual pay (40h pw).
Source: Bureau of Labor Statistics, May 2014 – all employees

(US continued) Earnings by gender for full-time employees (2014)

	Total		Men		Women	
	Number of workers (000)	Median weekly earnings ($)	Number of workers (000)	Median weekly earnings ($)	Number of workers (000)	Median weekly earnings ($)
Total, full-time wage and salary workers	106,526	$791	59,450	$871	47,076	$719
Benchmark						
Elementary and middle school teachers	2,730	980	534	1,096	2,196	956
Registered nurses	2,309	1,090	245	1,190	2,064	1,076
Care occupations						
Preschool and kindergarten teachers	499	634	13	-	486	625
Nursing assistants and home health aides	1,364	472	164	528	1,200	466
Childcare workers	406	442	21	-	385	444
Personal care aides	667	434	133	465	534	425

Source: Bureau of Labor Statistics, May 2014 – full-time employees

Europe (2010)

Eurostat data from the European Structure of earnings Survey (only establishment of 10 or more employees).

Occupational distribution of earnings and employees for the industry 'Human Health and social work activities'.

Monthly earnings (EUR)								
	Denmark		Germany		Italy		UK	
	Men	Women	Men	Women	Men	Women	Men	Women
Total	4,018	3,389	3,383	2,527	3,347	2,350	3,895	2,544
Managers	6,172	5,188	5,727	3,979	6,036	5,438	4,659	3,513
Professionals	4,939	3,889	5,840	3,704	6,326	4,855	5,622	3,490
Technicians and associate professionals	4,297	3,629	2,629	2,483	2,445	2,269	2,943	2,390
Clerical support workers	3,185	3,189	2,178	2,310	1,996	2,010	2,295	1,885
Service and sales workers	2,888	2,936	2,052	1,985	1,790	1,587	1,904	1,727
Skilled agricultural, forestry and fishery workers	:	:	2,112	1,818	1,798	2,246	1,593	1,822
Craft and related trades workers	:	:	2,567	1,940	2,039	1,405	2,649	2,064
Plant and machine operators and assemblers	:	:	1,697	1,781	2,150	1,830	1,817	1,752
Elementary occupations	2,957	2,655	1,759	1,762	1,821	1,547	1,784	1,553

Employees (000)								
	Denmark		Germany		Italy		UK	
	Men	Women	Men	Women	Men	Women	Men	Women
Total	114,088	517,297	683,005	2,259,498	349,778	733,724	774,435	2,549,184
Managers	4,982	8,739	18,315	21,936	15,628	10,885	57,394	117,071
Professionals	49,255	197,553	176,855	321,247	84,089	70,679	341,061	940,033
Technicians and associate professionals	6,501	41,940	296,311	1,257,104	123,889	364,935	95,621	280,128
Clerical support workers	2,137	15,715	27,945	143,592	49,009	95,158	40,166	300,239
Service and sales workers	45,027	229,048	95,354	308,880	37,953	144,069	168,743	800,602
Skilled agricultural, forestry and fishery workers	:	:	4,645	1,160	:	:	:	:
Craft and related trades workers	:	:	21,033	6,221	8,948	5,619	10,813	2,173
Plant and machine operators and assemblers	:	:	18,751	13,198	7,442	1,095	8,005	1,904
Elementary occupations	4,744	24,147	21,225	184,509	22,190	41,234	34,725	103,391

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The gendered employment gains of investing in social vs. physical infrastructure: evidence from simulations across seven OECD countries

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- The Ferguson Centre for African and Asian Studies
- Institute for Innovation Generation in the Life Sciences (Innogen)
- International Development Office (IDO).

The gendered employment gains of investing in social vs. physical infrastructure: evidence from simulations across seven OECD countries

Jerome De Henau and Susan Himmelweit

Abstract

Public spending on social infrastructure is usually seen as a cost rather than an investment, and not considered for investment-led Keynesian stimulus policies, despite having long-term economic and social benefits. This paper simulates and compares the (gendered) total employment effects of investing in the care and construction industries, as examples of social and physical infrastructure respectively, across seven OECD countries. Our simulations show that investment in care generates more total employment, including indirect and induced employment, than investment in construction, especially for women, and almost as much employment for men. This structural difference remains, though is somewhat reduced, if the analysis is conducted in FTEs with wages in care matched to those in construction. Further, the fiscal returns from investing in care are higher, allowing greater investment for the same net cost. Equalising *net* spending therefore gives investing in care a further advantage in employment creation over investing in construction.

Keywords: gender equality, investment, social infrastructure, care, employment
JEL: C67, H54, J16

Introduction

Public investment is needed in social as well as physical infrastructure (Elson and Pearson, 2015; Himmelweit, 2016; Ilkkaraçan, 2013, 2017; Onaran, 2017). "Social infrastructure" refers to the human and social capital produced by the education, health and care services that reproduce the economy and its workforce. For a Keynesian-inspired stimulus, only "physical

infrastructure" investment, such as constructing housing, roads and bridges, tends to be considered. However, both types of infrastructure provide public good benefits. As such, both require public intervention, because with social benefits greater than their private benefits, both will be underprovided if provision is left to market forces alone.

The 2007-08 financial crisis led to some public investment to stimulate economies, before subsequent fiscal retrenchment heavily restricted public spending (Ganelli and Trevala, 2016; Truger, 2016). Care services, neglected even before the crisis, were cut in many countries despite fast rising demand, leading to a 'care deficit', with damaging consequences for well-being. While investment in the construction sector was seen as productive and worthy of taxpayers' money, investment in care was presented as a cost whose funding should be contained (Elson, 2016). There was little or no gender impact analysis of such spending priorities, and little notice taken of empirical studies demonstrating the advantages of investing in care over investing in construction, in terms of both short-term employment creation and gender equality effects (Antonopoulos and Kim, 2011; Ilkkaraçan et al., 2015; De Henau et al., 2016).

Building on earlier work (De Henau et al., 2016), this paper compares the (gendered) total employment effects of investing in the caring and construction industries, as examples of social and physical infrastructure respectively, across seven OECD countries. The simulations show that, including indirect and induced employment effects, more employment in total, and especially for women, would be generated by investment in the caring industries. Further, the number of jobs generated for men would be almost as large as for investing in construction.

Perhaps these results could be explained by lower average wages and working hours in care than in construction found in nearly all countries. If these fully explained the additional employment generated, then investing in care would be a questionable gender equality policy that could work only by generating more poor-quality jobs for women. So, we additionally calculate our results in terms of full-time equivalent employment and reinvestigate employment generation after equalising wages in the two sectors. Although removing differences in hours and wages reduces the difference in employment generated, the conclusion remains robust that care generates superior employment results.

Some of the costs to the government of investing in either sector will be recouped through increased tax revenue from newly employed workers; more will be recouped the greater the employment created, reducing the net cost of the investment. We therefore also compare the level of employment creation by investment in the two industries for the same *net* cost.

The next section examines the gender biases inherent in the neglect of social infrastructure in public investment priorities and why that matters in the context of fiscal consolidation. We then go on to explore existing empirical evidence of the potential (gendered) employment gains from investing in social infrastructure, before describing our own comparative empirical approach and considering the factors that might explain our results. The following section outlines the simulation method and data we have used, before giving results that include some additional simulations to investigate how far differences in working hours or wage levels explain our results. The penultimate section examines fiscal effects, before the conclusion considers implications for investment policy as well as further research that might strengthen such a policy case.

The neglect of social infrastructure in gender-biased investment policies

Conventionally, a national infrastructure programme entails spending on physical construction projects such as roads, railways, telecommunications, hospitals, schools and green technologies (Skidelsky and Fraccaroli, 2017; IMF, 2014). While any expenditure will boost an economy operating below full capacity, the argument for delivering that boost by public investment in infrastructure is that it both has long-term benefits and, because those benefits have a public good character, is unlikely to be funded by private investors.

Both points also apply to what we call "social infrastructure", the human and social capital that is produced and maintained by caring services, health and education. Spending on these industries can be an investment when, like physical construction, it contributes to building a stock of capital, in this case human and social instead of physical capital, whose use leads to benefits for the future. Further, human and social capital also resembles physical infrastructure in that it benefits not only those who use it directly, but society as a whole. And, like physical infrastructure, human and social capital tend to be underprovided if left

purely to private investment. We therefore have public health, education and, increasingly, child and elder care systems, and it is reasonable to see much spending on them as investment in our "social infrastructure".[1]

In the 1990s, public spending on education and health began to be recognized as a form of social investment in workers' productivity and thus the productive capacity of the economy. Governments began to describe their role as enabling a 'social investment state' that by fostering employability skills and opportunities would increase productivity (Morel and Palier, 2011). Public spending on childcare was supported on similar grounds: but here the productivity gains were not only from children in the future, but also from mothers retained in the labour force continuing to use their skills (Jenson & Saint-Martin, 2003; Bonoli & Natali, 2012; European Commission, 2013).

This argument is rarely made about public spending on elder care, even though having fewer employment interruptions for carers and worries about their relatives' care is likely to make those workers more productive, as is not having concerns about their own future well-being. However, the argument that expenditure on preventative health and social care is an investment in future well-being that reduces the need for future public expenditure has gained ground over the past decade (Brouselle et al. 2016; Gaughan et al., 2015; Lopes, 2017).

Nevertheless, despite the expected impact on the economy and public finances, and the rhetoric of 'social investment', internationally agreed fiscal accounting methods treat physical and social infrastructure quite differently, with far-reaching funding implications. Spending on social infrastructure remains classified as 'current' rather than 'capital' expenditure in the national accounts (United Nations, 2009; Elson, 2017). The international System of National Accounts (SNA) considers spending on physical infrastructure alone as 'gross capital formation', its term for investment. The SNA counts only what is transferable to others as having value and contributing to GDP; it therefore does not value, or even recognise, human and social capital. As a result, the SNA classifies expenditure on the construction of schools, hospitals, care homes and nurseries, including on the wages of the

[1] This definition of "social infrastructure" differs from that used by many, such as the European Commission, who use it to refer to the physical infrastructure required for social services, thus school and hospital buildings (Fransen et al., 2018). In our definition, social infrastructure is the human and social capital that such services themselves build.

building workers, as capital expenditure. However, expenditure on what is done in these facilities, which largely goes on the wages of teachers, doctors, nurses and care workers, is classified as current expenditure.

The SNA distinction between capital and current spending matters because governments' rules and practices tend to be more tolerant of deficits incurred through making capital rather than current expenditure (Truger, 2016). This attitude is, at least in part, based on the premise that the former creates assets that generate revenue (often from increased economic activity) which can help pay off any resultant debt. Thus, the rigid criteria of the European Union's Stability and Growth Pact, for example, can be relaxed for investment purposes (IMF, 2014; OECD, 2017). Logically such "investment" should include spending on social infrastructure too, since such spending also generate assets: a well-functioning society and a healthy, well-educated population, both increasing productivity and generating future revenue (or, in the case of preventative investment, reducing the need for future spending).

Yet, despite the rhetoric of social investment, the economic and fiscal returns of spending on social infrastructure are hardly recognized. A blog arguing for investing in transport infrastructure, illustrates the point (Tweedale, 2018):

> ". . . we need a government that is focused on generating long term wealth through a strong economy, one that doesn't automatically divert funds to short term fixes to meet the raised voices calling for more money for the NHS [the National Health Service]. . . . my concern is that if we don't think and act to build long term wealth, we won't have the economy to generate the money to pay for the NHS . . ."

That health spending is seen as a 'quick shot-term fix' that has to be paid for by 'the economy', rather than building 'long term wealth', denies the role of social infrastructure in making the people more effective in generating such wealth.

Failure to recognise social infrastructure spending as investment, is consistent with a more general pro-market bias in what constitutes an economic gain, with contributions to GDP alone being counted, excluding those to any more inclusive concept of well-being. There is a related pro-market bias in how investment projects are appraised, with time that is priced through the wage being counted, while unpaid labour time is not. Economic assessments of

the value for money of social infrastructure spending, using standard accounting methodology, tend therefore to ignore the opportunity cost of unpaid care (Streeck and Mertens, 2011), reducing how effective such spending appears. As a consequence, social infrastructure services are seen as a drain on the public finances, leading to sub-optimal provision, and continual pressures to reduce costs, thereby reinforcing the need for unpaid domestic substitutes (Seguino, 2010).

Both those pro-market biases are also gender biases, in that women, by their greater contribution than men to unpaid care, are more likely both to make contributions to well-being not valued by the market and to have their labour time uncosted by it (Balakrishnan et al., 2016). There is also a gender bias in those who benefit from investment in physical versus social infrastructure. Continuing gender divisions in the roles of men and women, particularly with respect to care, lead women to make more use of healthcare, care and education services for themselves or for those for whom they care, while men, freed of such caring responsibilities, make more use of physical infrastructure, such as roads and railways (Gill, 2018). Further, where both private and public services exist alongside each other, publicly provided services are more likely to be used by women, because of their lower incomes on average, often consequent upon current or past caring roles.

Finally, competing spending priorities that favour physical infrastructure also create a gender bias in the employment opportunities generated, since in most countries physical infrastructure projects tend to employ mainly men, while social infrastructure services employ more women. It is this particular gender bias that the remainder of this paper investigates.

Employment effects of social infrastructure investment

Measuring the longer-term social and economic benefits of investing in social and physical infrastructure is difficult and subject to both methodological and conceptual challenges. However, the case for such investments is strengthened by any short-term employment opportunities they create, and further strengthened if they thereby reduce gender inequalities.

While such supply-side benefits of investing in care have been investigated at length (Ilkkaraçan, 2017), only a few studies have analysed the demand side employment creation effects of spending on care (see Ilkkaraçan, 2017, for a review; ILO, 2018; De Henau, 2019), and not many of these compare those effects with those of spending on other sectors. The German Ministry for Economic Affairs examined the impact on a range of economic indicators of staged annual investment in a range of sectors (including 'physical infrastructure' and 'all day school/childcare'). On all indicators investment in all day school/childcare outperformed investment in physical infrastructure, by generating more employment and greater fiscal returns (Krebs and Scheffel, 2016).

A method of investigation developed by the Levy Economics Institute, close to that of this paper, but simulating just direct and indirect employment effects, was used to compare the (gendered) employment generated by investment in care and in construction, as examples of industries that produce social and physical infrastructure respectively, for South Africa and the United States (Antonopoulos and Kim, 2011) and Turkey (Ilkkaraçan et al., 2015). In all three countries, investment in care generated far more employment, the majority of which went to women, whereas investment in construction resulted in fewer jobs, with more going to men.

This paper expands on these studies by (i) including induced employment effects and doing so cross-nationally, (ii) examining how far any difference in employment effects is due to differences in industries' working hours or wages and (iii) taking account of the fiscal revenue generated by employment creation to compare the employment effects of investments of similar *net* annual cost.

Empirical approach

Our comparative analysis examines seven OECD countries, namely, Australia, Denmark, Germany, Italy, Japan, the UK, and the USA, chosen to cover a variety of welfare systems, and differences in the level, quality and type of care provisioning.

Table 1 shows that public spending on care services varies greatly between the seven countries, reflecting different priorities of their welfare regimes.

Table 1 Public spending on care services (% GDP – circa 2011)

	Childcare services	Long-term care services
Australia	0.38	0.80
Denmark	1.51	2.35
Germany	0.49	1.02
Italy	0.62	1.04
Japan	0.13	1.87
United Kingdom	0.44	1.42
United States	0.37	0.57

Source: Authors' calculations based on OECD (2019) and De Henau et al. (2016)

Table 2 shows that the countries also vary in the relative importance of care and construction to employment, and in the working hours, gender composition and pay in the two industries, with workers in the care industry the more likely to be part-time, women and paid lower wages (the latter except in Japan). Self-employment is more prevalent in construction than in care, especially in the UK.

In order to make meaningful cross-country comparisons, we estimate the employment impact of investing 1% of GDP in the care and construction industries in each of our countries. We give the impact on employment broken down into direct, indirect and induced effects, as well as the gender breakdown of each of these effects.

"Direct employment effects" capture the employment created in the industry in which the investment takes place. Investment in any industry will generate additional employment as demand is increased for the products of its suppliers. Such demand will ripple down the supply chain, generating "indirect employment effects". Besides these indirect effects there are also "induced employment effects" as a result of the additional household income generated by the additional employment. Some of this additional household income will be spent and become a further source of increased demand within the economy, generating jobs in the sectors in which households spend their income.

Table 2 Employment structure in care and construction

	Total employment (000s)	% of total employment		% of FTEs / Headcount (HC) jobs		% women (HC)		Wage cost per FTE (relative to average wage cost)		% employees (HC)	
	All	Cons	Care	Cons	Care	Cons	Care	Cons	Care	Cons	Care
Australia	12,463	8%	4%	93%	76%	11%	79%	117%	114%	75%	96%
Denmark	2,756	6%	12%	79%	63%	10%	82%	90%	85%	89%	100%
Germany	38,702	7%	5%	94%	80%	13%	75%	79%	70%	81%	91%
Italy	22,513	8%	2%	97%	90%	6%	85%	76%	69%	62%	85%
Japan	66,569	9%	4%	91%	81%	14%	77%	72%	81%	71%	99%
UK	28,873	8%	6%	96%	81%	11%	80%	99%	44%	61%	92%
USA	182,278	5%	4%	-	-	13%	81%	115%	50%	65%	84%

Source: De Henau et al. (2016). HC stands for headcount (persons) and FTE for full-time equivalents. FTE data not available for the USA. Wage cost is measured by the total compensation of employees (= gross earnings + employers' social security contributions) per FTE employee in the industry as % of the national average.

There are a number of factors that might explain why total employment creation from investing the same amount in the two industries might be differ:

(i) Structural: the industries and their suppliers might differ in their labour intensity and/or the extent to which they use imported inputs directly and indirectly;
(ii) Working hours: the industries and their suppliers may differ in their typical hours of employment, so that the same number of working hours results in different number of jobs being created;
(iii) Wages: the two industries and their suppliers may pay different wages.

Which factor lies behind any differences in employment effects matters. If greater employment effects are found simply because wages are worse or hours shorter in one industry, then it begs the question of whether investment in it is simply expanding poor employment conditions. It is therefore important to consider whether the greater employment

effects of investing in a particular industry would remain even if conditions in that industry were improved.

Our first estimations are of the differences in the headcount employment effects of investing in the two industries, in which the contributions of factors (i) – (iii) are not distinguished. Subsequent estimations show how far any differences would be reduced if working hours and wage costs were equalised between the two industries (so that factors (ii) and (iii) did not apply). This leaves structural differences in labour and import intensity as the explanation of any remaining differences in employment effects. If these remain substantial, then improving working conditions in a lower-paying, but greater employment-generating industry, potentially a necessary condition for recruiting enough workers, reduce but do not undermine the case for investing in it.

Methods and data

This paper uses standard input-output multiplier methods to investigate the effect of increasing the demand and thus output of a single industry. Such methods assume that the physical input and employment requirements per unit of each industry's output remains unchanged, as do all prices and wages. Input-output tables show how much (in price terms) each industry's production process uses the output of every industry (including its own) as inputs.

The direct employment effect of increases in the output of an industry is calculated from that industry's labour input per unit of its output. I-O tables can then be used to calculate total input requirements down the supply chain and thus the *Type I employment multiplier* (directly and indirectly generated employment per additional worker directly employed).[2]

We use a similar process to calculate the *Type II employment multiplier* that also includes the "induced" employment effect of the increased earnings of the newly employed. To do this, households are effectively treated as another industry, whose inputs are given by the spending of households on the outputs of each other industry. Augmented I-O tables can then be used to calculate total employment generated including "induced" employment. Doing so assumes

[2] See Scottish government (2015) for more details on how multipliers are calculated using input-output tables.

additionally that the proportions in which households spend their total resources (both earned and unearned income) are unchanged (Scottish government, 2015).

Our calculation of induced effects does not include the effect of increased spending by the newly self-employed owing to lack of data on their income. Induced effects are therefore somewhat underestimated, and more so for investment in construction than in care, given the larger prevalence of self-employment in the former (Table 2).

That various ratios in production remain unchanged, in particular, that increasing demand for an industry does not change its production methods and the wages that it pays, is a strong but usual assumption in such analysis. However, the additional assumption required for calculating induced employment effects, that a policy that increases demand in one industry does not change the pattern of household spending, needs justification. For construction, it is not unreasonable; public construction projects are typically different from those on which households spend their income.[3] However, in the absence of public provision, some households spend money buying care that they may not need to once provision is publicly funded. So, to justify assuming unchanged household spending patterns, we should see the investment being modelled as providing publicly funded care services, but with a financial contribution required from households equal to the household sector's current spending on care.

We estimate gendered employment effects by assuming that current gender employment ratios by industry do not change as a result of such investments, again a strong assumption, but plausible given similar results obtained with more refined job-matching methods by Antonopoulos and Kim (2011) and Ilkkaraçan et al. (2015).

Data for input-output tables are derived from the national accounts and employment data from official labour force surveys, both provided by national statistical offices and Eurostat. The reference year is 2010 for Italy, Germany and the UK, 2011 for Denmark and Japan and 2013 for the USA and Australia.

[3] Spending might change as a result of the construction, but typically not while the investment in construction is being made, which is what matters here.

Results

Table 3 shows the direct, indirect and induced employment effects of a 1% of GDP investment in the care and construction industries. For comparative purposes, we report the number of jobs generated relative to the working-age population, i.e. by the rise in the employment rate.

Table 3 Rise in employment rate (% points) from investment of 1% of GDP in construction and care industries

	Construction				Care				Ratio of effects Care/Construction			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Australia	0.2	0.4	0.2	0.9	1.2	0.1	0.4	1.7	4.7	0.3	1.9	2.0
Denmark	0.4	0.3	0.1	0.8	1.3	0.1	0.2	1.6	3.1	0.5	1.7	2.0
Germany	0.5	0.3	0.2	0.9	1.4	0.2	0.3	1.9	2.8	0.7	1.6	2.0
Italy	0.3	0.4	0.1	0.8	0.8	0.3	0.2	1.2	2.4	0.7	1.6	1.5
Japan	0.7	0.4	0.3	1.4	1.0	0.2	0.4	1.7	1.5	0.6	1.2	1.2
UK	0.4	0.3	0.2	0.9	1.0	0.7	0.2	1.9	2.5	2.2	1.4	2.2
USA	0.6	0.3	0.6	1.5	1.7	0.3	0.8	2.7	2.7	0.9	1.3	1.8

Source: authors' calculations

Table 4 shows gendered employment effects by the percentage of jobs created that would be filled by women.

Table 4 Percentage of new jobs filled by women by investment in construction and care industries

	Construction				Care			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Australia	11%	32%	50%	32%	79%	43%	50%	68%
Denmark	10%	32%	44%	26%	82%	41%	44%	69%
Germany	13%	33%	51%	28%	75%	50%	51%	67%
Italy	6%	24%	44%	21%	85%	53%	44%	70%
Japan	14%	33%	46%	29%	77%	41%	46%	62%
UK	11%	23%	46%	24%	80%	67%	46%	69%
USA	13%	37%	52%	35%	81%	43%	52%	67%

Source: authors' calculations

Direct effects

Table 3 shows that the direct employment effect of investing in care is considerably larger than that of investing in construction in all countries. The ratio of employment created in the two industries varies from less than twice as many in care as in construction in Japan to nearly five times as many in Australia. Both these industries are highly gender-segregated – construction even more so than care – so that of the jobs directly generated, only 6-14% would go to women in construction, but 75-85% of the jobs in care. In Italy the direct impact of investment in care appears lower than in other countries, where it is unlikely that the data used fully captures the well-known "grey economy" of migrants in Italy's social care system, leaving formal care provision geared towards less labour-intensive residential nursing care (Mingione, 2009; OECD, 2011).

Indirect effects

Table 3 shows that in all countries except the UK, indirect job creation is greater if the investment is made in construction than in care. This is consistent with construction using more inputs provided by other industries than the more labour-intensive care industry.

However, the greater indirect employment effects of investing in construction do not outweigh the greater direct effects of investing in care, so the total Type I effect, the sum of direct and indirect employment effects remains larger for investment in care.

Again, the size of the indirect effect varies across countries, with the UK an outlier for care, and Australia for construction. More detailed calculations show that two thirds (65%) of the UK care industry's large indirect effect is within the care sector itself, which means its indirect employment effect on other industries, at 0.2% points, is similar to that of other countries. This is consistent with the care sector in the UK outsourcing a particularly large proportion of its inputs within itself due to the intense local commissioning of private long-term care by public authorities. This also explains why the UK's direct employment effect in care relatively low. The total within-industry effects (both direct and indirect) for the UK at 1.4% points is in the middle of its range over the countries studied. The other outlier is Australia, whose construction sector generates particularly large indirect employment effects (and the lowest direct employment effect), reflecting both outsourcing to specialised trades in other industries and sub-contracting between firms within the construction sector (Toner, 2006).

The indirect employment generated by investment in construction, like the direct employment, is also male-dominated (Table 4). However, the indirect employment generated by investment in care is not in general female-dominated. The argument that investing in construction infrastructure provides jobs for all – through indirectly generating jobs going to women as much as to men – is not supported by our results. But the (reverse) argument holds up better for care; although the direct jobs generated by investment in care are female dominated, the indirectly generated jobs in general favour men.

Induced effects

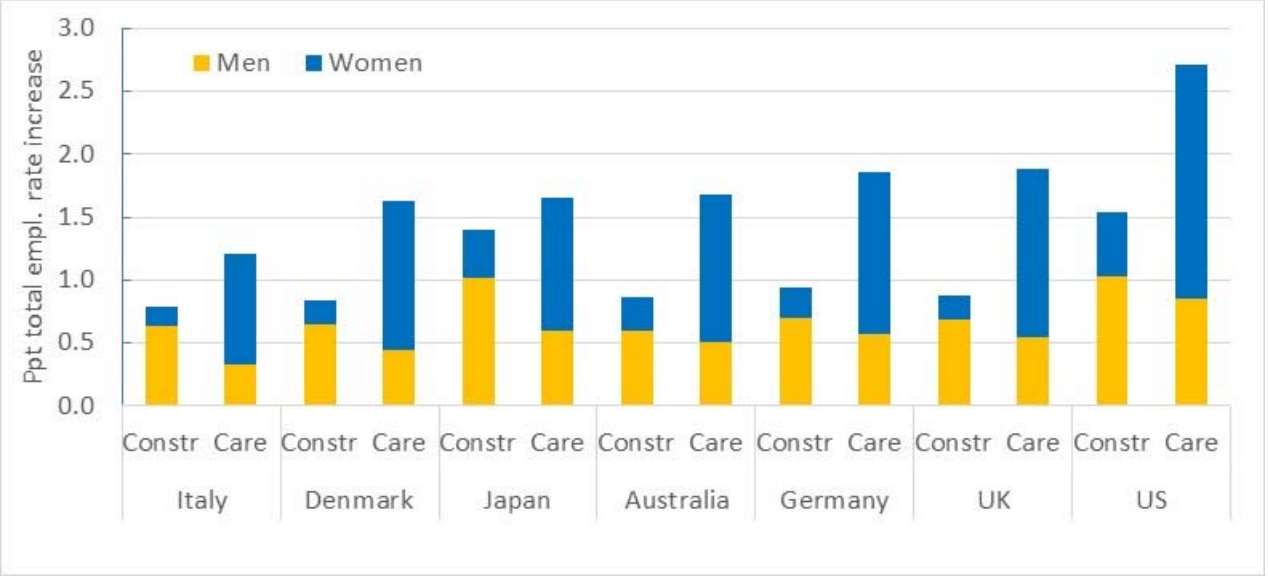
The induced effects of investment in the care sector are larger than those for the construction sector. This reflects higher additional earnings due to a larger Type II employment effect failing to outweigh generally lower wages in direct employment in care. That the gender breakdown of the induced employment effects is estimated to be the same for both industries is a consequence of our method of treating the household sector like an industry, which

entails the assumption that the proportions in which households spend their income do not vary.

Total effects

Summing the direct, indirect and induced employment effects, Table 3 and Figure 1 show that a much greater number of jobs are created overall (at least 50% more - except in Japan) by investment in care.

Figure 1 Contributions of men and women to total employment rate increase



Source: authors' calculations (countries ranked by total employment generated by investment in care)

Further, investment in care creates more jobs for women. However, because it creates so many more jobs overall, in most countries it is only slightly less effective than investment in construction in creating jobs for men (in the US, UK, Germany and Australia less than 20% fewer jobs). Therefore, investment in construction, one of the sectors likely to be thought about for an employment stimulus, is not the most effective way to boost overall employment, is far less effective for women's employment and only somewhat more so for men's. Indeed, investment in construction increases the gender employment gap, while investment in care decreases it.

Additional simulations

Working hours

To assess the extent to which different working hours in the care and construction industries contribute to our results, we repeated our simulations in terms of full-time equivalent (FTE) employment. Table 5 gives the ratio of employment effects both in FTEs and in headcount numbers (from Table 3), for every country except the USA, for which data on FTEs is not available.

Since the method of analysis necessarily makes the two industries' induced effects of identical composition their ratio is unchanged by switching to FTEs, but for direct and indirect effects the ratio is reduced, reflecting lower average hours worked in care than construction (Table 2), and to some extent in their supplying industries too. However, even in FTE terms investment in care generates far more employment than investment in construction. So, the differential effect, although reduced, cannot be attributed to differences in working hours alone.

The last panel of Table 5 shows the effect of considering employees only (a necessary benchmark for the wage adjustment simulations carried out in the next section). Reflecting the larger proportion of employees in care than in construction (Table 2), the ratios of direct employment effects of investment in care relative to construction increase sharply, but less so for total effects (there is little change in indirect effects, and none in induced effects because in both estimations of the latter we have data on the additional income of only employees).

Table 5 Ratio of employment effects (care/construction) in headcount and FTE employment and employees

	Ratio of headcount employment effects (care/construction)				Ratio of FTE employment effects (care/construction)				Ratio of FTE employee effects* (care/construction)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Australia	4.7	0.3	1.9	2.0	3.8	0.3	1.9	1.7	4.8	0.3	1.9	1.9
Denmark	3.1	0.5	1.7	2.0	2.4	0.4	1.7	1.7	2.9	0.4	1.7	1.8
Germany	2.8	0.7	1.6	2.0	2.4	0.7	1.6	1.8	2.6	0.7	1.6	1.9
Italy	2.4	0.7	1.6	1.5	2.3	0.7	1.6	1.5	3.1	0.7	1.6	1.8
Japan	1.4	0.6	1.2	1.2	1.3	0.6	1.2	1.1	1.5	0.5	1.2	1.2
UK	2.5	2.2	1.4	2.2	2.1	2.0	1.4	1.9	3.2	2.3	1.4	2.5
USA	2.7	0.9	1.3	1.8	-	-	-	-	3.5	0.8	1.3	2.0

Source: authors' calculations. (*Headcount employees for USA)

Wages

To assess the extent to which different wages paid in the two industries contribute to our results, we have repeated our analyses assuming that wages in the two industries are the same, specifically that workers in care are paid the same as those in construction. In this section we estimate the result for full-time equivalent employees only, since deriving self-employment income was not possible from the input-output information available.

As Table 2 shows, except in Australia and the USA, neither industry pays above the average wage, but in all countries except Japan, construction workers are paid more than care workers, and in all except Australia, care workers are paid less than the average wage.

Working out the effect of matching wages in care to those in construction on employment generation requires calculating anew:

(i) direct employment effects, because higher wages will affect the price of care and hence how much can be purchased by a given sum of money; direct employment will be reduced by a factor that is less than proportional to the rise in wages.

(ii) employment multipliers; the same inputs will be needed per worker in care, so the Type I multiplier will not change, but the rise in earnings of care workers will change the Type II multiplier.

The detail of the calculations and implicit assumptions made are provided in the Appendix.

The last panel of Table 6 shows that in most countries, matching wages in care to those of construction reduces the total employment generated by investing in care by 7% or less. Indeed, it increases employment slightly in Japan, where wages in construction are lower than those in care, as would be expected. The two exceptions with a larger impact on employment creation are the UK and the USA, the countries in which care workers are exceptionally badly paid. Even in those countries, the more than doubling of wages in care needed to match those in construction reduces total employment creation by less than a third. In all countries, except Japan there is a loss in the direct and indirect jobs created (and therefore in the quantity of care provided), but this is partly compensated by additional induced employment due to the higher wages, so that care continues to outperform construction in total employment creation by at least a quarter in all countries and by at least two thirds in most.

Table 6 Ratio of increase in FTE employees (care/construction), before and after matching wages in care to those of construction

	Ratio of increase in FTE employees†, before wage match (Care/ Construction)				Ratio of increase in FTE employees†, after wage match (Care/ Construction)				% change in employment effects from wage match			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Australia	4.8	0.3	1.9	1.9	4.7	0.3	1.9	1.9	-2%	-2%	0%	-2%
Denmark	2.9	0.4	1.7	1.8	2.7	0.4	1.7	1.8	-5%	-5%	1%	-4%
Germany	2.6	0.7	1.6	1.9	2.4	0.6	1.6	1.8	-8%	-8%	2%	-7%
Italy	3.1	0.7	1.6	1.8	3.0	0.7	1.6	1.7	-5%	-5%	3%	-4%
Japan	1.5	0.5	1.2	1.2	1.6	0.6	1.2	1.3	9%	9%	-2%	6%
UK	3.2	2.3	1.4	2.5	1.9	1.4	1.6	1.7	-40%	-40%	15%	-33%
USA	3.5	0.8	1.3	2.0	2.0	0.5	1.4	1.4	-43%	-43%	11%	-29%

† For USA, headcount employees. Source: Authors' calculations

Removing those other influences suggests that the additional employment effects of investing in care over those of construction must be structural, a result of differences in the labour and import intensity of the two industries. Even when wages are equalised and FTEs counted, care outperforms construction in job creation. It is therefore a better candidate for employment stimulus in times of less than full employment.

Effects on fiscal revenue

Even when employment levels are high, investing in care can expand the economy because, as well as increasing the demand for labour, investing in care increases its supply by freeing up those previously engaged in unpaid care to take employment or increase their working hours. This is not the case for construction jobs.[4] Estimating the size of such an increase in labour supply has to be country-specific since it will depend on specific national care systems, the size and quality of the care investment relative to unmet need, who is currently performing unpaid care and on how likely they are to take employment if other forms of care are available.

[4] While new physical infrastructure such as a bridge may also subsequently enable some people to take jobs that they could not previously, the labour supply is not expanded during its construction.

Any jobs that are filled by people previously not in employment, whether through unemployment or care responsibilities, will reduce the net cost of the investment in care through generating tax revenues and reducing claims for social security benefit. Tax and benefit systems are highly country-specific, so net revenue effects are hard to estimate cross-nationally, but a rough estimate of average wages and thus average tax due for each country can be calculated. For each country, Table 7 shows the tax wedge, the total income tax and social security contributions paid by an employee and their employer, divided by the total wage cost (gross earnings + employer's social security contributions) at average wages. This can be used roughly to estimate total income tax and social security contributions from the new jobs created.

Table 7 Short-term fiscal effects of investing in care and construction (FTE employees at matched wages)

	Tax wedge at average wages	Net cost as percentage of gross cost		Ratio (Care/ Construction) of increase in FTE employees†, matching	
		constr.	care	gross spending	net spending
Australia	27%	85%	70%	1.9	2.3
Denmark	37%	79%	65%	1.8	2.2
Germany	49%	72%	54%	1.8	2.3
Italy	47%	79%	67%	1.7	2.0
Japan	31%	76%	71%	1.3	1.4
UK	33%	82%	70%	1.7	1.9
USA	31%	71%	58%	1.4	1.7

Source: authors' calculations

The tax wedge reduces the net cost of any investment in an industry. Table 7 shows that the net cost of an investment in construction ranges from 71% of its gross cost in the USA to 85% in Australia, and for care, in the case where wages are equal to those in construction, from 54% in Germany to 71% in Japan. These relatively lower net costs mean that between 29% and 46% of the gross spending in care is recouped in revenue from income tax and social security contributions.

This comparative ‘fiscal advantage’ of care over construction means equalising *net* spending gives investing in care a further advantage in employment creation over investing in construction. As Table 7 shows, equalising net spending in this way raises substantially the ratio of total FTE jobs created. In all countries, except Japan and the US, spending the same net amount on care as on construction would yield close to twice as many jobs in total.

However, if the economy is at full capacity, many jobs created in construction will be filled by existing workers, reducing the revenue gain, so gross and net spending will not differ much. By contrast, because investment in care frees up unpaid carers to take at least some of the new jobs created, then more of the full revenue gain can be expected to be realised.

Conclusion

Conventionally, governments wishing to boost the economy tend to invest in physical infrastructure, seeing such investment as a means of raising employment in the short-term that also generates longer-term economic prosperity. Such thinking tends to see spending on care and other forms of social infrastructure as an unproductive cost, rather than as making an investment in the economy and its long-term future. In many countries, this sector is targeted for cuts in times of fiscal consolidation.

This paper has shown that greater employment gains can be made by investing in social infrastructure, and specifically in the care industry. Further, the employment gains of investing in care are not reliant on unemployment, because care services enable unpaid carers to take employment and thus expand the labour supply. This is not a feature of most physical infrastructure investment.

Even accounting for the shorter hours and lower wages paid in the care industry, investment in it still produces more jobs overall than investment in construction, owing to structural differences between the two sectors: care is a more labour-intensive and less import-intensive industry than construction. Investment in care also yields far more employment for women and not substantially less for men, reducing the gender employment gap, whereas investment

in construction increases it. Further, the fiscal returns from investing in care are higher, allowing greater investment for the same net cost.

Now that, after years of austerity, expansionary public investment-led fiscal policies are being considered, such results need to become more widely known. At the very least our results show that governments and international institutions, such as the IMF, the OECD and the World Bank, would benefit from conducting gendered employment analyses of such policies. Social infrastructure investment policies should be considered on an equal basis with physical infrastructure programmes, and where the latter are still implemented, they should be complemented by policies to mitigate their adverse effects on gender employment gaps.

Further research at the country level could establish more refined employment characteristics of the jobs created, such as their wage distribution, include consideration of the earnings of the self-employed and more detailed analysis of the fiscal impact of any such investment. De Henau (2019), for example, calculated that for the UK investing in high quality free universal childcare, while costing 3.1% of GDP annually, would recoup that total cost in fewer than ten years from the increased maternal employment it would enable.

Of course, the case for investing public funds in high quality care services does not rely solely on the employment it creates, or even its beneficial effects on gender employment gaps. Public investment in care is required to support those in need of it, children and frail elderly alike, and to alleviate and support the unpaid work of their parents and carers. While children come in both sexes, the majority of those in need of long-term care are women, as are most of those providing unpaid care, making this a gender equality issue too (OECD, 2011).

Longitudinal estimations of the economic and social benefits of such policies would strengthen the case. But these will also require different measures that better capture the benefits of a more equal society and improved well-being. Only then will we be able to show how much spending on care is really an investment, adding to well-being while preventing the need for less effective and often more expensive interventions later on.

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Appendix

Calculations of the employment effect of wage adjustments

To work the effect of changing wages in care on employment generation requires calculating changed:

(i) direct employment effects
(ii) employment multipliers

Direct employment effects
To calculate these we have to assume that care is not a significant input into any other industry's production. This assumption is justified by observing that, the maximum proportion of its total input cost spent on care by any other industry is 2.8% in Italy for the healthcare industry, while for most industries it is virtually zero.

Despite the wage change, from W to W', the same amount is invested in care, so the additional output of care O is unchanged in price terms. So (using $'$ to indicate variables whose values may have changed)

$$I + WE = O = O' = I' + W'E' \quad (1)$$

where E is the direct employment generated by the investment in care, W the average wage level in care per FTE, so that WE is the wage component and I the non-wage component of that investment.

Then (using lower case letters for ratios assumed not to change)

$I = I_i + I_p$ where,

$I_p = sO =$ taxes on products and other non-wage components (profits) of value-added in the care industry (assumed a fixed proportion s of the value of output, O) and

$I_i = I_c + I_{nc} =$ cost of intermediate goods used by the care industry, where:

$I_c = dO =$ cost of care as an intermediate good used in the production of O, assumed a fixed proportion d of O, since any change in the price of care will affect care as an output and as an input in the same way

$I_{nc} = bE =$ cost of non-care intermediate goods used in the production of O, assumed a fixed proportion b of E, the newly generated direct employment in care, since the cost of non-care intermediate goods per worker in care should be unchanged because the price of those goods has not changed

So that

$$I = I_c + I_{nc} + I_p = dO + bE + sO$$

(2)

Substituting for I and I' in equation (1):

$$dO + bE + sO + WE = dO' + bE' + sO' + W'E'$$

(3)

but $= O'$, so that

$$E'/E = {(b + W)}\Big/{(b + W')}$$

Thus, if wages change from W to W', direct employment generated is changed by a factor of ${(b + W)}\Big/{(b + W')}$

Indirect and induced effects

As explained in the paper, the Type I multiplier, $1 + M_1$, stays the same, so that

$$M_1' = M_1$$

(4)

To calculate the Type II multiplier, $1 + \mathrm{M}_1 + M_2$, we have to make an additional assumption, that care is not a significant consumer good, so that any change in the price of care does not significantly affect how household income is spent. This assumption is justified by observing that the proportion spent on care by households is greatest at 3.3% in the US, less than 2% in Japan, Australia and Denmark and less than 1% in Italy, Germany and the UK.

Any change in the size of M_2 depends, for each directly employed worker in care, purely on how many directly and indirectly employed workers' pay has changed, and how large that change is. The Type 1 within-care employment multiplier, c, gives the number of workers directly and indirectly employed in care per directly employed worker in care. These are the only workers who receive pay changes.

Then if wages in care change from W to W' (in national currency units)

$$M_2{}' = M_2 + c(W' - W)e$$

(5)

where e is the employment directly generated by households spending an additional unit of national currency (a constant, since the composition of household spending is assumed fixed).

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A Care-Led Recovery From COVID-19: Investing In High-Quality Care To Stimulate and Rebalance the Economy

Jérôme De Henau and Susan Himmelweit

ABSTRACT

The COVID-19 pandemic has both devastated employment prospects, particularly of women, and exposed the longstanding neglect of care systems and poor employment conditions of care workers. Most recovery programs propose to stimulate employment by focusing on investment in construction, ignoring gender equality issues. This paper argues for public investment in high-quality care services and better conditions for care workers to build a more gender-equal caring economy. Using input–output analysis, across selected European Union countries and the United States, the study shows a care-led recovery has superior employment outcomes to investment in construction, even when wages and hours are matched. In particular, matching employment and wages in care to the high levels of Scandinavian countries would raise employment rates by more than 5 percentage points and halve most gender employment gaps, while the net cost of investment in construction that achieved as much would generally be at least twice as high.

KEYWORDS

Care, social infrastructure, economic stimulus, investment, input–output analysis, gender equality

JEL Codes: C67, H51, J16

HIGHLIGHTS

- Public investment in high-quality care is vital to building a more gender-equal economy.
- Recovery from COVID-19 requires investment in social, not just physical, infrastructure.
- A care-led, rather than construction-led, recovery program creates more jobs and reduces gender inequality.
- More jobs would be created even when employment conditions for care workers are improved.

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- A more caring economy, employing more people in care jobs, is also a greener economy.

INTRODUCTION

COVID-19 has caused not only a health crisis, but an economic one. Unemployment rates have risen across the world or are expected to surge when job retention schemes end, and debate continues about how long high levels of unemployment will persist (Organisation for Economic Co-operation and Development [OECD] 2020a). Many jobs, and perhaps some whole industries, are likely to be permanently lost. While in previous recessions men tended to lose their jobs faster than women, this may not be true this time. Women are more likely to be employed in the worst affected industries, such as retail, hospitality, and personal services (International Labour Organization [ILO] 2020). Moreover, the bulk of increased unpaid childcare, home schooling, and care for the frail elderly has fallen on women, making them more exposed to the risk of lay-offs by employers (Mascherini and Bisello 2020; OECD 2020a). Further government spending, beyond that already made to cope with the immediate effects of the pandemic, will be needed over many years to create jobs and close the widening gender employment gap.

Many COVID-19 recovery proposals for new investments to generate employment have been made, including some that aim to rebalance the economy in a more desirable direction, such as the range of Green New Deals proposed in many countries. Nearly all focus on investing in the construction industry, even where it is to improve the carbon footprint of existing buildings (European Commission 2020; HM Treasury 2020). Few, however, look to the gender impacts of their proposals or even note that focusing investment on the construction industry will worsen the gender employment gap, unless efforts are made to employ a majority of women, and no proposal is specifically designed to create a more gender-equal economy.

This paper argues that in order to rebuild in a better, more gender-equal way, a feminist COVID-19 recovery program should include substantial investment in child- and eldercare services. This investment is necessary to reduce the many gender inequalities that turn on the unequal division of unpaid care responsibilities between women and men. Care systems that relieve some of that unpaid care would help tackle gender inequality, but only if the care provided is of good quality and its workers are well treated; otherwise, that same gender inequality is likely simply to be transferred from the unpaid into the paid economy (Folbre 1995).

Before the pandemic, after a decade of austerity in many countries, most European care systems were failing to prevent a resurgence of demand for unpaid and informal care due to limitations in the quality, affordability, and

availability of formal long-term social care provision. High turnover rates and recruitment difficulties due to poor pay and paid working conditions compounded a situation in which care workers were given insufficient training to be able to provide high-quality, person-centered care (Coster et al. 2018). Among the sectors in urgent need of reform, long-term care was a low priority for most governments. The failure of many high-income countries to protect vulnerable care home residents from infection and death can be seen as a symptom of the low level of attention given to the sector, as can the deaths through cross infection of clients of home care workers sent out without personal protection equipment (PPE; Miller 2020). In England and Wales, both residential and domiciliary care workers have experienced significantly higher death rates from COVID-19 than most other occupations, including front-line healthcare workers, who were more likely to have access to PPE (Office for National Statistics [ONS] 2020).

There were also significant failings in childcare provision before the pandemic, with parents in many countries finding childcare too expensive, poor quality, or simply unavailable, relying instead on informal care by relatives, especially grandparents, and/or on mothers working part time or not at all (Ferragina 2017). The large-scale closure of childcare facilities and schools during the pandemic has exacerbated these gender inequalities, with mothers shown to be taking on a larger share of the additional childcare than fathers (Mascherini and Bisello 2020; OECD 2020a). Public investment in childcare facilities will be especially needed in the recovery as many private sector childcare providers may be bankrupted by uncertain demand after the pandemic (Strauss 2020), while informal childcare arrangements by vulnerable grandparents may no longer be considered safe (British Medical Association [BMA] 2020).

The coronavirus pandemic has intensified the gender-equality case for investing in affordable, high-quality care. But is this investment also a route to recovery from the employment crisis? Such investment would generate jobs not only in care, but also in the industries supplying care, and it would stimulate the economy through the spending of newly employed workers. This paper investigates the employment-generating aspects of such a care-led recovery program for a variety of OECD countries. It does so by extending the methods (based on input–output analysis) of an earlier cross-national study (De Henau et al. 2016), which compared the job-generating potential of spending on care versus construction, the usual focus of economic-stimulus programs, even green ones. However, unlike that report or similar empirical analyses (Antonopoulos and Kim 2011; Kim, İlkkaracan, and Kaya 2019), we also model improving the conditions under which care workers are employed, as would be essential if the investment were to result in reducing gender inequality by delivering better quality care.

Any investment in care would not only be a short-run stimulus, but could also be the basis for a permanently more caring economy, rebalanced by having more of its paid workforce employed in good jobs providing high-quality care. Such a change should in the long-term reduce the need for future expenditure while raising more tax revenue. But, even in the short-term, any government stimulus to the economy will partially pay for itself by generating increased tax revenues, reducing the net cost of the stimulus. We therefore also compare the level of employment creation by investment in the two industries for the same net cost.

Finally, for the main results of this paper, we look at the level of additional employment that would be generated for women and men if sufficient investment were made in each country to have a well-functioning care system, adequately staffed by appropriately paid workers, and we compare the net cost of this investment to that of producing the same level of overall employment from investment in construction.

INVESTING IN CARE

Our comparative analysis examines eight OECD countries – Denmark, Sweden, France, Germany, the United Kingdom, the United States, Spain, and Italy (plus the EU-28 as a whole) – chosen to cover a variety of welfare systems and differences in the level, quality, and type of care provisioning (De Henau et al. 2016; Coster et al. 2018). Table 1 shows how the relative importance of care-sector employment and wages varies across these economies and the consequent overall spending on the care industry. Here by care we mean both child daycare and adult long-term care, provided both in residential settings and at home.[1] Throughout this analysis we use wages as a proxy indicator for both care and employment quality, while recognizing that other conditions including sufficient time, training, and job continuity are required for workers to be able to provide high-quality care.

While Sweden and Denmark rely on overwhelmingly publicly funded care services, employing a relatively large proportion of their workforce, countries like the UK and the US, favoring market and quasi-market solutions, employ fewer in care with significantly lower wages. Italy and Spain have traditionally relied more on family care, with low levels of formal employment in care, while France and Germany have intermediate employment levels based on a more complex mix of social assistance and social insurance provision. Table 1 also shows that the headcount (HC) percentage employed in the care sector translates into different percentages of full-time equivalent (FTE) employees because the countries vary in the average hours worked in their care sectors. Wage levels per FTE in care relative to each country's average earnings also vary, but in all countries remain below those of construction. All countries have a

Table 1 Employment, relative wages, overall spending, and gender in care services and the gender employment gap (2015[a])

	Care as % of all HC employees (1)	*Care as % of all FTE[b] employees (2)*	*FTE wage in care (relative to average) (3)*	*FTE wage in care (relative to construction) (4)*	*Total spending on care (% GDP) (5)*	*% women in care employment (FTE) (6)*	*Overall HC gender employment gap (% pt.) (7)*
Denmark	11.4%	11.2%	81%	88%	6.5%	83%	6.5
Sweden	10.4%	10.0%	86%	87%	6.1%	79%	3.0
France	8.0%	7.5%	69%	70%	3.6%	86%	6.5
Germany	6.0%	5.7%	62%	67%	2.7%	74%	8.0
UK	5.7%	5.4%	51%	42%	3.5%	76%	9.6
US	4.6%	4.6%	50%	44%	2.2%	81%	8.7
Spain	3.0%	3.0%	72%	72%	1.9%	86%	10.2
Italy	2.5%	2.5%	56%	70%	1.2%	82%	18.3
EU-28	5.1%	4.7%	81%	91%	2.9%	81%	10.5

Notes: [a]2013 for US. [b]HC only for US, FTE data not available. EU-28 includes the twenty-seven member states of the European Union in 2015, that is, including the UK as well as Croatia.

Sources: Authors' calculations based on Bureau of Economic Analysis (2015), Eurostat (2020), and OECD (2020b).

preponderance of women employees in the care sector and a significant but varying gender employment gap.

Investment in an industry increases the amount bought from that industry (its demand). The investment works as an economic stimulus by generating three types of employment effects. *Direct* employment effects capture the employment immediately created in that industry. Investment in any industry will also generate additional employment as demand is increased for the products of its suppliers. Such demand will ripple down the supply chain, generating *indirect* employment, possibly including within the same industry. There is also *induced* employment due to the additional household income generated by the additional employment, some of which will be spent and become a further source of increased demand within the economy, generating jobs in the sectors in which households spend their income.

There are differences between the care and the construction industries that might explain why total employment creation from investing the same amount in the two industries may vary:

(1) Labor and import intensity: the care industry is more labor intensive and uses fewer non-labor inputs, such as machinery and raw materials; this means the number of jobs directly generated is higher. The construction industry uses more inputs and so indirect employment should be higher than for care, unless those inputs are imported.
(2) Paid working hours: as working hours are shorter in the care industry, more people can be directly employed for the same amount spent.
(3) Wages: with lower wages in care, more people can be directly employed for the same amount spent. But the total wages paid to both directly and indirectly employed workers determine the induced employment effect, and the influence of care's low wage levels may be counterbalanced by a greater total number of workers employed.

Our simulations will estimate the net effects on total employment generation of these competing and complementary factors.

Both industries are also highly segregated by gender, construction more so than care (OECD 2020b). Whether jobs generated are "men's" or "women's" jobs depends on the gender breakdown of employment not only in the industry itself, but in its supplying industries and those supplying the induced demand for consumer goods. But who actually takes those jobs also depends on what else changes in society, including any specific gender-equality intentions of the investment programs; improving wages might also make employment in care more attractive to men.

Whilst investment in construction projects tends to be one-off, even if over a long period, the case for investing in care is to create a permanent shift in employment based on recurrent spending. Indeed, the benefits of having an economy more focused on care would remain after any post-pandemic recession is over, giving good reason for any investment in care to continue beyond its requirement as an economic stimulus. An improved care system that relieves unpaid caring labor will also expand the labor supply, by enabling more people to take employment and, whether by taxation or user fees, contribute to the care system's cost. Additionally, there would be long-term productivity gains from the increased capabilities of those receiving care, the key feature of such spending that justifies calling it an investment (De Henau et al. 2016).

METHODS AND DATA

This paper uses standard input–output (I–O) multiplier methods to investigate the effect of increasing the demand and thus output of a single industry. Input–output tables show (in price terms) how much each industry's production process uses the output of every industry (including its own) as inputs.

The direct employment effect of an increase in the output of an industry is calculated from that industry's labor input per unit of its output. I–O tables can then be used to calculate total input requirements for each industry down the supply chain and thus the industry's *Type I employment multiplier* (directly and indirectly generated employment per additional worker directly employed). The vector of directly and indirectly generated employment effects is the product of the matrix of total input requirements (the Leontief inverse of the direct requirement matrix) and the vector of the total number of jobs by industry per unit of output. The employment multiplier for an industry is calculated by multiplying the amount of investment needed to create one directly generated job in that industry by this vector.

We use a similar process to calculate the *Type II employment multiplier* that also includes the induced employment effect of the increased earnings of the newly employed. To do this, households are effectively treated as another industry, whose inputs are given by the spending of households on the outputs of every other industry. Augmented I–O tables can then be used to calculate total employment generated including induced employment.[2]

Standard input–output methods assume that in volume terms the input and employment requirements per unit of each industry's output remain unchanged, as do prices and wages in all industries (except when we simulate different wage levels for care). This is a strong but usual assumption in such analysis (De Henau et al. 2016). However, the additional assumption required for calculating induced employment

effects – that a policy that increases demand in one industry does not change the pattern of household spending – needs justification. For construction, it is not unreasonable; public construction projects are typically different from those on which households spend their income.[3] However, prior to the public investment in care, some households may spend money buying care that they may not need to once that public investment is made (for example, if childcare becomes free). So, to justify assuming unchanged household spending patterns, we should see the investment being modelled as providing publicly funded care services but with a financial contribution required from households equal to the household sector's prior spending on care.

As Table 1 shows, in all countries, care is paid below average wages and below construction wages. We estimate the effect of improving wages (as a proxy for paid working conditions more generally) by calculating anew:[4]

(1) direct employment effects because higher wages will affect the price of care and hence how much can be purchased by a given sum of money; direct employment will be reduced by a factor that is less than proportional to the rise in wages.
(2) employment multipliers; the same inputs will be needed per worker in care, so the Type I multiplier will not change, but the rise in the earnings of care workers will raise the Type II multiplier.

We estimate gendered employment effects by assuming that current gender employment ratios by industry do not change.[5] We will return to this when discussing our results, especially on the effect of raising wages in the care industry.

For European countries, (augmented) input–output tables (sixty-four industries) are derived from the national accounts, and data for employment by industry, gender, and working time are taken from official national labor force surveys. Both sources are produced and harmonized by Eurostat. Data for the US is provided by the US Bureau of Economic Analysis, which produces symmetric input–output tables for seventy industries. The reference year is 2015 for European countries and 2013 for the US.

EMPLOYMENT COMPARISONS

To compare the employment effects of investing equivalent amounts in the care and construction industries, Table 2 shows ratios of: the increase in employment *within* the industry directly targeted (which may include some indirect effects if that industry's output is also used as an input); the increase in total employment across the economy; and the increases in total employment for men and women. Panel A shows these ratios for

Table 2 Ratios of employment effects: investment in care vs. investment in construction

	(A) Headcount employees at current wages				*(B) FTE employees[a] matching wages in the two industries*			
	Within-industry effects (all)	*Total effects (all)*	*Total effects (women)*	*Total effects (men)*	*Within-industry effects (all)*	*Total effects (all)*	*Total effects (women)*	*Total effects (men)*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Denmark	3.5	2.2	6.6	0.8	2.9	1.9	6.5	0.7
Sweden	3.0	1.9	6.0	0.7	2.4	1.6	5.4	0.6
France	3.9	2.3	6.6	0.6	2.6	1.7	5.0	0.5
Germany	4.0	2.6	6.1	1.0	2.5	1.8	4.9	0.8
UK	5.1	2.7	6.3	1.1	2.4	1.6	3.9	0.8
US	3.5	2.0	4.0	0.9	2.0	1.4	2.7	0.7
Spain	3.1	2.0	5.2	0.7	2.2	1.6	4.5	0.6
Italy	3.7	2.4	7.0	0.8	2.7	1.9	6.1	0.7
EU-28	3.3	1.8	4.2	0.8	2.6	1.6	4.0	0.7

Notes: [a] Headcount employees for the US.
Source: Authors' calculations.

the numbers of jobs (headcount) at current wages. Panel B shows what those ratios would be if wages of the new workers were equalized in the two industries (at construction wages), expressing all jobs in FTEs – for every country except the US where data on FTEs is not available.

Looking at Panel A, across all countries, the within-industry employment created by investing in care at current wages and hours is consistently considerably larger, by a factor of three or more, than that of investing in construction (column 1).

One standard argument made for using construction to stimulate the economy is that it has a high employment multiplier, the ratio of indirectly to directly generated jobs, so that other industries are stimulated too. Consistent with this, column 2 shows that the ratio of total employment generated does not favor care as much as the ratio of within-industry employment generated. But it is not the ratio of indirect to direct employment that matters for a stimulus but the total direct, indirect, and induced employment. Summing these (not shown separately) gives much greater total employment creation by investment in care. And the total employment generated outside each industry is roughly the same because of greater induced effects from investment in care.

Comparing Panel B with Panel A, in all countries, jobs created in care are reduced by paying care workers higher wages, and by counting jobs in FTEs (comparing columns 1 and 5), but for overall employment this is partially offset by the higher wages generating additional induced employment (comparing columns 2 and 6). Investment in care continues to outperform investment in construction in total employment creation by at least 60 percent in all European countries, and by 40 percent in the US (column 6).

Table 2 (column 3) also shows that investing in care produces far larger employment increases for women than investing in construction. Because of its larger total employment effects, investment in care still produces employment gains for men (column 4) not far below those for construction: roughly equal (at going wages) in the UK and Germany, 90 percent in the US, and across the EU-28 overall 80 percent. This is on the assumption that nothing is done to reduce gender segregation in either industry, though higher wages in care might encourage more men to join the profession, making the relative gains in Panel B an overestimate for women (column 7) and an underestimate for men (column 8).

The additional employment effects of investing in care over those of construction are not simply the result of poorer wages and different paid work hours in the two industries and those that supply them. Even when wages are equalized and FTEs counted, care outperforms construction in job creation and more so for women. Investing in a reformed care sector with good pay and work conditions is, therefore, an excellent candidate to lead the employment recovery from COVID-19, while going some way

to redressing the gender imbalance in job losses, improving the working lives of a large number of women, and laying the foundations for a more gender-equal economy.

EFFECTS ON FISCAL REVENUE

Any well-planned investment in infrastructure, whether in care or construction, should bring long-term benefits that reduce the need for future expenditure and/or raise more tax revenue. But, even in the short-term, any government stimulus to an economy operating at less than full employment will partially pay for itself by generating increased revenues.

Tax and benefit systems are highly country-specific, but a rough estimate of the taxes paid on average wages and increased household expenditure can be calculated. For each country, the first column of Table 3 shows the *tax wedge*, the income tax and social security contributions paid by an average wage employee and their employer, divided by the total labor cost (gross earnings + employer's social security contributions) of employing that worker. The second column shows indirect (consumption) tax incidence on average incomes, which can be added to the tax wedge to estimate the additional tax revenue collected through the new jobs created (assuming they are net gains to employment, as would be expected for a stimulus program).

Such additional tax revenue reduces the net cost of any investment. Columns 3 and 4 show that net costs are consistently a smaller proportion of gross costs for investment in care than for investment in construction because the former results in more being paid in wages on which tax is levied. These relatively lower net costs mean that between a third (in the UK) and almost three-fifths (France and Germany) of any gross spending in care is recouped in revenue from taxes and social security contributions.

This comparative "fiscal merit" of care over construction means equalizing *net* spending gives investing in care a further advantage in total employment creation. As columns 5 and 6 show, equalizing net spending in this way raises substantially the ratio of total FTE jobs created.

HOW MUCH CARE IS NEEDED?

The aim of the stimulus is not just to generate employment, but to help restructure the economy to have a well-functioning care system that rewards its workers fairly. This requires investment in both increased wages for existing care workers and in additional employment in care at those increased wages, both of which generate employment and in turn change average wages and the total level of employment. To gauge how much of an investment is needed, we estimate how much public spending would need to increase to generate proportions of the working population employed in

Table 3 Short-term fiscal effects of investing in care and construction (FTE employees at matched wages)

	Tax wedge at average wages (1)	*Indirect tax incidence on average incomes* (2)	*Net spending as percentage of gross spending*		*Ratio (Care/Construction) of increase in FTE employees[a], matching*	
			Construction (3)	*Care* (4)	*Gross spending* (5)	*Net spending* (6)
Denmark	34%	12%	75%	54%	1.9	2.6
Sweden	41%	13%	70%	52%	1.6	2.2
France	46%	10%	65%	42%	1.7	2.6
Germany	47%	11%	67%	41%	1.8	3.0
UK	30%	11%	78%	64%	1.6	1.9
US	30%	8%	66%	52%	1.4	1.8
Spain	39%	15%	70%	52%	1.6	2.2
Italy	47%	11%	74%	54%	1.9	2.6
EU-28	40%	10%	64%	44%	1.6	2.4

Notes: [a]Headcount employees for the US.
Source: Authors' calculations using OECD (2020b) and Eurostat (2020) for tax data.

Table 4 Matching Scandinavian employment and wages in care

	Additional care empl. needed (1)	*Wage rise needed in care industry* (2)	*Resulting rise in overall empl. rate (% pt)* (3)	*Resulting rise in women's empl. rate (% pt)* (4)	*Resulting fall in gender empl. gap* (5)	*Additional gross spending in care required (% GDP)* (6)	*Additional net spending required (% GDP) to achieve total employment rate as in column (3) if investment is in:*	
							care (7)	*construction* (8)
France	39%	18%	2.5	3.8	− 41%	2.2%	0.9%	2.3%
Germany	88%	30%	5.3	7.6	− 57%	3.5%	1.4%	4.4%
UK	101%	61%	5.6	7.5	− 40%	4.9%	3.1%	6.8%
US	144%	62%	8.4	11.3	− 65%	5.2%	2.7%	5.1%
Spain	277%	10%	6.3	9.5	− 63%	5.8%	3.1%	7.7%
Italy	352%	43%	5.7	8.4	− 30%	5.3%	2.8%	7.6%
EU-28	132%	0%	6.0	8.5	− 48%	3.7%	1.6%	4.3%

Source: Authors' calculations.

care and paid at relative wage levels similar to those of the more generous public care systems of Denmark and Sweden (Table 1). The results in Table 4 were calculated by setting each country's employment in care to 10 percent of the total and wages in care to 81 percent of average wages, the lower of Denmark's and Sweden's on each measure, respectively.

The first two columns of Table 4 show the scale of the catch-up required, which reflects the relative positions of each country illustrated in Table 1. In most countries, care employment would need to more than double, except for France whose child- and eldercare systems are already more developed (Table 1), and to a lesser extent, Germany. Spain and Italy would require their care workforce to more than treble. More than doubling of care employment is required in the EU-28 and the US. Wages would need to rise substantially in the US, UK, and Italy, and to a lesser extent, in Germany, though not in the EU as a whole, as care workers are generally relatively better paid in the smaller EU countries.

As a result, except for in France, an increase of at least 5 percentage points in the overall employment rate of these economies would be achieved (and up to 8.4 percentage points in the US). Women's employment rate would rise substantially everywhere (column 4). The gender employment gap in all of these economies would also fall significantly, particularly in Spain, Germany, and the US. The direction of change is clear, but the magnitude of the figures in columns 4 and 5 should be seen as an upper bound, due to the possible effect of increased wages on gender segregation in the care industry.

Most economies would require an increase in spending of 5 percent or more of GDP to make such an investment (column 6), which in net terms would be around 3 percent or less of GDP, and only about 1.5 percent in Germany and the EU as a whole (column 7). For comparison, column 8 of Table 4 shows that the additional net spending required to achieve the same total employment creation via investment in construction would be more than twice as large.

CONCLUSION

Economic recovery from COVID-19 will require stimulus through public expenditure. Unlike previous crises, women's jobs have been particularly vulnerable during the pandemic. This paper has shown that a greater employment stimulus could be made in any recovery plan by including investment in care rather than focusing just on construction, the conventional object of stimulus programs. Even allowing for the shorter hours and lower wages in the care industry, investment in this industry still produces more jobs overall and, at current gender ratios, more jobs for women, though not substantially fewer for men. The gender employment gap would fall, whereas any investment in construction would increase it,

unless the majority of new jobs went to women, requiring unprecedented attempts to change the industry's gender imbalance. Further, the fiscal returns from investing in care are higher, allowing greater investment for the same net cost.

The paper has also shown how employment might be restructured and how much it might cost if countries were to invest in having care systems equal to the best, by having a greater proportion of their workforce employed in the care industry, and raising its wages, providing a significant care-led component to any COVID-19 recovery plan in countries that currently employ too few care workers or treat them badly. But improving the quality of care provision is not just a matter of raising wages alone: more care jobs at higher pay need to reflect improved training, working conditions, and career structures to be effective. This will be necessary, but not sufficient, if gender segregation in the industry is to be challenged (Block et al. 2019).

The case made in this paper for investing in high-quality care does not negate the desirability of gender-segregation challenging investment in construction as well. Indeed, improving many care services will in itself require building more care-compliant housing as well as specific daycare centers.

While the COVID-19 pandemic has shown that aspects of social infrastructure need investment and better treatment of its paid workers, notably the health systems of many countries, it has glaringly exposed the neglect of and inadequacies in care systems throughout the world. This has been a longstanding concern of feminist economists. In many parts of the world, by bringing recognition to the vital role of care work in sustaining the economy and the social fabric, COVID-19 may have created a political climate in which arguments for investing in a care-led recovery might get a better hearing.

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NOTES

[1] For EU countries, the two industries of the NACE-2digit classification: 87 (Residential care) and 88 (Social work without accommodation); for the US, the two industries of its NAICS classification: 623 (Nursing and residential care) and 624 (Social assistance).

[2] Because input–output tables make the income of the self-employed indistinguishable from profits, induced effects can only be measured for employees; therefore, for consistency, we simulate results for employees only. However, with relatively more self-employment in construction than care, ignoring any increased self-employment generated reduces estimated employment effects more for construction than for care.

[3] Spending might change as a result of such construction, but typically not while the investment in construction is being made (for example, railways and wind farms), which is what matters here.

[4] Calculations are based on the reasonable assumption that care is not a sizeable input into any other industry's production process or into the household sector's spending overall (De Henau and Himmelweit 2020).

[5] This is also implicit in studies using more refined job-matching methods, such as Rania Antonopoulos and Kijong Kim (2011) and Kijong Kim, İpek İlkkaracan, and Tolga Kaya (2019).

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