

# Men who care too much do not work: a systematic review and meta-analysis of the effect of unpaid caregiving by men on their labour market participation

Rui Fu (✉ [rui.fu@mail.utoronto.ca](mailto:rui.fu@mail.utoronto.ca))

Institute of Health Policy, Management and Evaluation, University of Toronto <https://orcid.org/0000-0002-0577-2830>

Jennifer Guo

Institute of Health Policy, Management and Evaluation, University of Toronto

Peter C. Coyte

Institute of Health Policy, Management and Evaluation, University of Toronto <https://orcid.org/0000-0002-2993-3491>

---

## Research Article

**Keywords:** Informal caregiving, labour force participation, family caregivers, masculinities, time allocation

**Posted Date:** April 5th, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-390046/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

---

# Abstract

**Objective:** We conducted a systematic review and meta-analysis to assess the effect of unpaid caregiving by men on their labour force participation (LFP).

**Methods:** English-language journal articles, dissertations and working/conference papers from the MEDLINE, Embase, AgeLine, EconLit, EconPapers and the International Bibliography of the Social Science databases were searched from January 2007 to February 2021. We pooled the marginal effect of caregiving on men's LFP in a random-effects model where LFP was defined as being gainfully employed while non-LFP comprised all other circumstances. Non-parametric methods were used to estimate the probability that caregiving was negatively associated with LFP. Meta-regressions were conducted with countries stratified by Gross National Income (GNI) per capita as a moderator variable. Secondary analyses were performed on employed men to assess the potential caregiving effect on temporary work exit and permanent retirement.

**Results:** Thirty-one studies (904,694 men) were included in the review with 28 of these studies (892,805 men) used in the meta-analysis. The random-effects model found men who were weekly, daily or primary caregivers to experience a 4.4%, 8.0% and 10.0% reduction in their LFP, when compared to their respective counterparts. We estimated weekly, daily or primary caregivers to have an 87.3% (95% CI: 70%-96%), 87.5% (95% CI: 84%-96%) and 80.8% (95% CI: 67%-100%) chance of a lower LFP. An hourly increase in caregiving was unrelated to LFP ( $p$ -value=0.106). Among employed men (24,319 men), caregiving was found to be unrelated with retirement ( $p$ -value=0.156) and no meta-analysis was conducted on temporary work exit. No difference was found across countries stratified by GNI per capita.

**Conclusions:** These results urge policy decisionmakers to provide more flexible work arrangements and other protective measures to support male employees who are weekly, daily or primary caregivers. Future meta-analyses should explore the effect of caregiving on other dimensions of labour supply (e.g., hours of work) by men. The scarcity of studies conducted in low-/middle-income countries might be addressed by creating population-based cohorts following the protocol of existing studies such as the American HRS (Health and Retirement Study).

**JEL classification:** J16, J20, J22, J26

## Introduction

### Background

Caregiving has traditionally been regarded as "women's work", although the number of male caregivers is on the rise.<sup>1</sup> Just before the coronavirus pandemic, 40% of unpaid caregivers aged 50+ across OECD countries were men.<sup>2</sup> During 2019, 21% of American adults indicated that they provided some unpaid care, with 39% of these caregivers being men.<sup>3</sup> A similar distribution of caregivers by sex has been noted in Australia and Europe, with a few countries (such as Sweden) reporting equivalent, or even slightly more, male than female unpaid caregivers.<sup>4,5</sup>

Among outcomes that may be adversely impacted by caregiving, labour force participation (LFP) is particularly important, as the working-age population is already shrinking at an alarming rate due to population ageing.<sup>6</sup> Since men comprise more than half of the working population and are experiencing a faster decline in their rates of employment than women,<sup>7</sup> it is crucial to assess if, and to what extent, caregiving might hinder the LFP among the general male population; and furthermore, how it might lead to temporary withdrawal from the labour market or permanent work exit (i.e., retirement) among men that are employed.

While most examinations of the relationship between unpaid caregiving and work are performed in high-income countries (HICs), especially Western countries, there are opportunities to explore the unique circumstances facing this trade-off for men in other regions of the world. Indeed, the unique social and economic structures of low-/middle-income countries (LMICs) might imply that men face inherently different pressures when balancing work and caregiving. First, the demand for home-based informal care is very high in LMICs due to the limited supply of public formal care, especially for those services that substitute for informal caregiving.<sup>8,9</sup> Second, owing to improved education, maternal health, and shifts in social norms and family roles, the majority of LMICs have seen a faster increase in the share of women in the labour force compared to HICs.<sup>10</sup> Indeed, one of the unintended consequence of a surging LFP

among women is a potentially heavier burden of caregiving placed on men. Third, many LMICs have highly unbalanced gender ratios in the society, a result of gender selection through prenatal sex determination and selective abortions.<sup>11–13</sup> As men significantly outnumber women, wifeless single men are potentially tasked with heavy eldercare duties. And finally, LMICs tend to have less government or employer supported family-friendly policies, while having laws that mandate unpaid caregiving for the elderly (observed in countries such as China<sup>14</sup>). These observations warrant investigations into the association between care provision and LFP in men from LMICs to understand how they seek out the economic trade-off between paid work and unpaid caregiving.

Building upon the results of previous reviews on the burden of men who were caregivers<sup>15,16</sup> and reviews that have specifically dealt with the association between caregiving and labour supply<sup>17–20</sup>, we conducted this systematic review and meta-analysis to assess the following three questions:

**Q1.** Does unpaid caregiving impact men's LFP?

**Q2.** Among employed men, does care provision influence the risk of temporarily withdrawing from the labour market or exiting work permanently (retirement)?

**Q3.** Is there a differential effect of caregiving on men's LFP between HICs and LMICs?

Answers to these questions can potentially inform strategies that enhance the work prospects of men who perform caregiving duties and may help identify tailored policy to assist men in their balancing of work and caregiving, in general, and for men in LMICs, in particular.

## Methods

### Theoretical framework

The economic theories of specialization, bargaining and the division of labour are commonly used to explain the higher LFP of men over women.<sup>21–23</sup> Notably, Jacob Mincer modelled women's time allocation across leisure, home production, and labour work, while restricting the choice for men to be between just work and leisure.<sup>24</sup> Based on the concept of the reservation wage, women would compare their market wage to the value of their time allocated to home production or leisure,<sup>25–27</sup> whereas the comparison faced by men was between their market wage and the value of their leisure time. Regardless of gender, the standard labour-leisure choice model is often invoked to theorize individual decisions between unpaid caregiving and paid work. This model states that when confronted with caregiving duties, individuals maximize their overall well-being by allocating time spent in ways that equalize the return on time allocated to alternative activities, i.e., the concept of equimarginal returns is invoked.<sup>28–30</sup> This concept when applied to the decision to work (or not) suggests that when holding all else constant, an increase in caregiving intensity (that is usually operationalized as the hours of caregiving) results in an availability effect that tends to lower individuals' LFP, resulting in temporary work exit or potentially permanent retirement. The caregiving-LFP relationship also depends on individual preference orderings between labour and leisure, social context, the life cycle and other factors.<sup>31,32</sup> The association can also take on more complex mathematical forms that involve both kinks and/or discontinuities if a caregiving threshold(s) is deemed plausible.<sup>33</sup>

### Study eligibility

This study is registered on the Open Science Framework and follows the Meta-analyses of Observational Studies in Epidemiology (MOOSE) guideline.<sup>34</sup> We searched for empirical studies that were published between January 1, 2007 and February 15, 2021 to avoid those that had been repeatedly reviewed.<sup>17–20</sup> Studies were included when they examined the relationship between unpaid caregiving by men and their LFP (i.e., whether they were gainfully employed) in a regression analysis. We also included studies of strictly employed men where they assessed the association between caregiving and work exit (i.e., temporarily quitted working) or retirement (i.e., permanently ceased working). Studies on the intention to participate in the labour market or only assessing the reciprocal association (i.e., how LFP influenced men's care provision) were excluded. Studies that only examined living arrangements (such as living with grandchildren) or the presence of a health condition (such as having a spouse with cancer) without explicitly measuring men's caregiving activities were excluded as well. Further exclusions were performed for simulation studies, qualitative studies and reviews, although their reference lists were inspected.

## Literature search

One reviewer (RF) conducted literature search on February 15, 2021 using a combination of subject headers and keywords on MEDLINE, Embase, AgeLine, EconLit, EconPapers and the International Bibliography of the Social Science databases. The search strategies were designed in consultation with a librarian. English-language journal articles, working/conference papers and dissertations were included. The same reviewer applied the snowball method to track additional papers outside the protocol-driven database search strategies.<sup>35</sup> These citations were uploaded to the Covidence platform where two reviewers (RF and JG) independently screened the abstract, title and the full text to determine their eligibility. Disagreements were resolved through discussion.

## Measuring caregiving

Because studies varied extensively in their measurement of caregiving, we categorized four types of caregiving—including any caregiving, daily caregiving, primary caregiving, and intensive caregiving—using definitions drawn from existing studies. Any caregiving refers to the provision of at least 100 hours of care over the past 2 years (or approximately, at least an hour of caregiving per week). This definition was drawn from the American HRS (Health and Retirement Study) that has been used in the European SHARE (Survey of Health, Ageing and Retirement in Europe) as well.<sup>36,37</sup> Daily caregivers were those who either reported spending 10 hours or more per week (or about 1,000 hours or more over 2 years) on caregiving or reported the performance of caregiving on a daily basis. Primary (or main) caregivers were defined as those who self-identified as such. No consensus has been reached in the literature regarding the definition of intensive caregivers.<sup>19</sup> In order to maintain consistency within this review and with the most recent systematic review on this topic,<sup>19</sup> we used 15 hours or more of caregiving per week to define intensive caregivers and by doing so distinguished them from daily caregivers who were defined by a threshold of 10 hours or more of care per week. Hours of caregiving was considered as another measurement of caregiving. The care tasks involved, the identity of the care recipients, the status of being a new caregiver, and the co-residential status of the caregiver with the recipient were explored narratively.

## Data extraction

Studies were included in the meta-analysis if they reported the marginal effect and the associated standard error of unpaid caregiving on men's LFP. The marginal effect corresponds to the coefficient estimate of caregiving in a linear probability model estimated using the OLS (ordinary least-squares) method or it is the average *ceteris paribus* probability effect of caregiving on being in the labour market estimated from a probit or logistic regression.<sup>38</sup> For studies that did not report a marginal effect, we reached out to the authors to request the availability of such an estimate and received two replies from seven requests. For studies that used instrumental variables to overcome the potential endogeneity of caregiving, we extracted the corresponding marginal effect estimates unless the study failed to reject exogeneity.

## Random-effects meta-analysis and meta-regression

For the caregiving categories and for hours of caregiving, we used separate random-effects models to pool the marginal effect estimates to yield an average caregiving effect on men's LFP. The random-effects models were estimated using the restricted maximum likelihood methods with the Hartung-Knapp standard error adjustment to mitigate potentially high heterogeneity.<sup>39</sup> For each set of analysis, publication bias was assessed in a funnel plot with the Egger's test using the 5% threshold for statistical significance.<sup>40</sup> Non-parametric methods were applied to estimate the probability of men experiencing a reduction in LFP due to caregiving.<sup>41,42</sup> Meta-regressions were conducted to explore the presence of a differential caregiving effect on LFP between HICs and LMICs. This was performed by dichotomizing the place of data origin to be either a HIC or a LMIC using the World Bank's US\$12,536 threshold for per-capita Gross National Income.<sup>43</sup>

## Secondary analysis and risk of bias assessment

Two secondary analyses were carried out for the outcomes of temporary work exit and retirement, respectively, using studies of strictly employed men. A modified Newcastle-Ottawa Scale for cohort studies was applied to assess the quality of evidence.<sup>44</sup> Specifically, we replaced the "study has controlled for the most important factor" item with whether studies have utilized any techniques to mitigate the potential endogeneity of caregiving. We also removed the item that required studies to not include any individuals who presented with

the outcome at the start of the study. Thus, studies could score 0-8 in total, where we deemed scores of 7-8, 5-6 and below 5 to indicate low, medium or high risk of bias.

## Results

### Study selection

The literature review yielded 2,189 citations, of which 1,661 were unique (Figure 1). Twelve additional studies were found using snowballing, leading to 1,673 studies for title and abstract screening. The full texts of 182 studies were subsequently assessed. We excluded 152 studies for the following reasons: duplicates (n=1) or published in non-English (n=1); did not assess LFP (n=50) or only assessed anticipated LFP (n=1); qualitative studies (n=16), reviews (n=7), simulation studies (n=1), or editorials or governmental reports (n=7); involved only women (n=14) or did not report results for men (n=9); did not assess the caregiving-LFP relationship (n=20), only assessed the reciprocal relationship (n=12), or were unrelated to caregiving (n=12). These procedures yielded 31 studies for our review of which 28 were used in the meta-analysis.

### Characteristics of the included studies

The 31 studies drew data from 904,694 (non-unique) men from several regionally based cohorts (Table 1). European-based studies comprised half of all studies (n=14), followed by seven studies using data from North America, another seven conducted in Asia, and three in Oceania (Australia). Only three studies were based in a LMIC, including two from China<sup>45,46</sup> and one from Indonesia<sup>47</sup>. Sample sizes of men ranged from 265 to 768,125. While most (n=20) studies focused on men aged 45+, five included men in their 20s and three even included men below 20 years of age. Fourteen studies focused on specific care recipients, such as parents/parents-in-law (n=10) or only grandchildren (n=1) or both (n=3), while the remainder kept a wide range of care recipients.

### The marginal effect of caregiving on men's LFP

Twenty-three studies (876,880 men) estimated the effect of caregiving on LFP (Table 2). Fourteen studies used instrumental variables, wherein six confirmed caregiving to be endogenous. By excluding the three studies that did not report a marginal effect,<sup>48-50</sup> results from the remaining 20 studies (864,991 men) were entered into the meta-analysis. Random-effects models were estimated for any, daily, primary, and hours of caregiving, respectively, while a narrative synthesis of results on intensive caregiving is presented herein due to the scarcity of studies (n=2) that it precluded a meta-analysis. Meta-regressions were conducted for any caregiving and hours of caregiving, as no LMIC-based studies were identified for the other caregiving categories.

Any caregiving (i.e., at least weekly provision of care) was assessed by 17 studies.<sup>17,36,37,46,47,51-62</sup> The random-effects model (Figure 2) found a significant 4.42-percentage-point reduction (95% CI: -0.0662 to -0.0222, p-value=0.0003) in LFP associated with any caregiving. Heterogeneity was high ( $I^2=84.4\%$ ) and publication bias was ruled out (p-value=0.254). We estimated the chance that any caregiving lowered LFP to be 87.3% (95% CI: 70% to 96%). Being in a LMIC did not modify the association between any caregiving and LFP (p-value=0.208).

Nine studies assessed the effect of daily caregiving on men's LFP.<sup>36,37,54-60</sup> Using the random-effects model (Figure 3), the reduction in LFP due to daily caregiving was 8.00 percentage points (95% CI: -0.125 to -0.0347) and significant (p-value=0.002). Heterogeneity was very high ( $I^2=96.3\%$ ), but there was no publication bias (p-value=0.459). We found in 87.5% (95% CI: 84.0% to 96.0%) of the time men who were daily caregivers would experience a reduction in LFP.

Men who were primary caregivers were assessed in three studies.<sup>55,61,62</sup> The random-effects model (Figure 4) found that they faced a significant 10.0-percentage-point reduction in LFP (95% CI: -0.151 to -0.049, p-value<0.001). Heterogeneity was moderately high ( $I^2=68.8\%$ ) though no publication bias was found (p-value=0.393). We estimated that 80.8% (95% CI: 67.0% to 100%) of the time primary caregiving would reduce LFP for men.

Two studies assessed the impact of intensive caregiving beyond 15 hours per week on LFP. A South Korean study found that compared to non-caregiving men, those providing 1-19 hours or at least 20 hours of caregiving per week experienced a 2.8-percentage-point (95% CI: -0.162 to 0.106) and 9.3-percentage-point (95% CI: -0.276 to 0.090) insignificant decrease in LFP, respectively.<sup>54</sup> Another large census-based UK study suggested that up to 20 hours of caregiving per week did not affect men's LFP; however, spending 50 or more hours per week on caregiving decreased their LFP by 24.9 percentage points (p-value<0.01).<sup>60</sup>

Four studies accessed the effect of caregiving hours on men's LFP.<sup>45,54,63,64</sup> The random-effects model (Figure 5) found each hourly increase in caregiving to be associated with an insignificant 0.2-percentage-point decrease in LFP (95% CI: -0.0004 to 0.001, p-value=0.106). The level of heterogeneity was relatively low ( $I^2=31.1\%$ ) and no publication bias was detected (p-value=0.813). There was a 37.2% chance (95% CI: 9.73% to 84.7%) of lower LFP with greater hours of caregiving. We also found via meta-regression that there was an insignificant difference between men from HICs and LMICs (p-value=0.494).

### Secondary analysis on employed men

Five studies (18,689 employed men) assessed the association between care provision and temporary work exit (Table 3). We did not perform any meta-analysis due to the use of odds ratios and/or hazard ratios in these studies. Among studies of new caregivers, the only significant association was found in the UK where caregiving men who were new co-residents with the care recipient experienced higher odds of work exit during the same year compared to men who were not caregivers (odds ratio=1.61, 95% CI: 1.02 to 2.20).<sup>65</sup> However, the hours of caregiving were unrelated to the risk of work exit among new caregiving men.<sup>65,66</sup> When the analysis was stratified by distinct caregiving tasks, one UK study found those providing personal, basic or instrumental care were not at any higher risk of work exit than their non-caregiving counterparts.<sup>67</sup> Finally, two studies—based in Canada and the UK, respectively—found middle-aged male caregivers did not exit work at a higher rate than non-caregivers.<sup>68,69</sup>

The effect of caregiving on decision to retire was assessed in five studies involving 15,432 employed men (Table 4). A random-effects meta-analysis was performed on three of these studies and ruled out the association between any caregiving and retirement (p-value=0.156).<sup>37,51,70</sup> Two American studies found no effect of personal caregiving, chore caregiving, or spousal caregiving on men's retirement.<sup>37,51</sup> A German study also ruled out the effect of co-residence with a care recipient on retirement.<sup>71</sup> Three studies have evaluated the impact of hours of caregiving.<sup>37,71,72</sup> In Canada, providing up to 5 hours of care per week increased the relative risk that men would be fully retired over being fully employed (relative risk ratio=1.52, 95% CI: 1.05 to 1.99). However, the effect was absent among men providing more than 5 hours of care per week.<sup>72</sup>

### Appraisal of study bias

The modified Newcastle-Ottawa Scale was used to critically appraise the quality of each study (Table 5). Studies scored generally high between 5-8 by using large nationally (or regionally) based panel data and reasonably measured caregiving and labour market outcomes. Points were deducted for studies relied solely on cross-sectional data and/or did not conduct any procedures to examine the potential endogeneity of caregiving.

## Discussion

By systematically reviewing and meta-analyzing published results since 2007, our study provided answers to the three research questions: namely, **(Q1)** men who were weekly, daily or primary caregivers had lower LFP than their counterparts, while the LFP was unaffected by an hourly increase in caregiving; **(Q2)** caregiving did not impact men's decision to permanently retire, although no meta-analyses were conducted on temporary work exit due to the unavailability of marginal effect estimates from those studies; **(Q3)** while there were only 3 studies from LMICs included in our review, thereby lowering the statistical power of our analysis, we were unable to distinguish differences in caregiving-LFP relationship between men in HICs and LMICs.

This is the first meta-analysis to confirm a statistically significant reduction in LFP among men who were weekly, daily or primary caregivers. Both Lilly et al (2007) and Bauer & Sousa-Poza (2015) found little to no evidence of a lower LFP among caregivers, although they did not distinguish caregivers by gender nor did they classify caregivers by the intensity of care.<sup>17,18</sup> Moussa (2018) reviewed the literature on the LFP of unpaid caregivers of elders across OECD countries.<sup>19</sup> Although this review did concur with our findings on a decreasing trend of LFP among more "intensive" caregivers, the focus was placed on women, as 30% (14 of 48) of the studies reviewed were conducted exclusively on women. Moreover, some findings appeared to be left out from the discussion, particular the three studies that demonstrated reductions in LFP for men who cared for elders.<sup>37,66,71</sup> These observations imply that prior reviews may have inadequately captured the labour consequences of caregiving in men. As female caregivers dominate the empirical literature, the experiences of men are not well known, as reflected in these reviews.<sup>15,16</sup>

Our results are consistent with the labour-leisure choice model that predicts that while small increases in caregiving time tend to cause reductions in leisure rather than work, larger incursions are often sufficient to shift time away from work to result in non-participation in

the labour market. According to our findings, being tasked with at least weekly caregiving (that extends to daily or primary caregiving) could represent meaningful threshold as when men consider exiting from the labour market. Furthermore, when leisure is restored as a result of shifting time away from work, it is both desired in itself and may represent a resource that supports the provision of care, i.e., men might devote some leisure time to invest in the ability of caregiving. Hence, when the care demand is small, the required “training time” may also be small; however, when caregiving becomes more intensive and difficult, men may require substantial time out of their total leisure time to invest in caregiving ability, which may ultimately lead to labour force non-participation.<sup>73</sup> In our analysis, men who are weekly, daily or primary caregivers might allocate time from work to “learn” how to care. This is a plausible observation as previous findings have shown men find certain types of care work, such as personal care tasks including bathing, dressing and toileting to be extremely challenging.<sup>15,16</sup> Some men also find seemingly easier tasks, such as cooking, to require extensive learning and practices as well.<sup>16</sup>

We found that there was a scarcity of studies examining the caregiving-LFP association of men in LMICs. Thus, we were unable to confidently rule out the role of country type, even with the insignificant results from meta-regressions. Most LMICs lack the data sources that are essential for this line of research, i.e., a large population-based cohort with detailed individual-level data on sociodemographic status, household structures, health, labour supply and unpaid caregiving behaviours. Another recently concluded review also deemed the volume of literature on caregivers from LMICs to be insufficient for a meta-analysis.<sup>74</sup>

The findings of this study offered insights for labour and social policies to enhance the work prospects of men who are unpaid caregivers. In order to retain these employees, employers might consider adopting family-friendly policies (e.g., flexible work hours) and worker benefit (e.g., paternal leaves).<sup>75</sup> Educational programs may be designed to deliver coping strategies to support male employees responsible for caregiving. For example, men are shown to prefer problem-focused, task-oriented coping strategies rather than story-sharing and emotional support;<sup>1</sup> hence, interventions such as support groups need to reflect the unique demands and approaches of male caregivers.<sup>76</sup> It is also important that these interventions do not strengthen caregiving as “women’s work”, as male caregivers may not seek help due to the constraints of holding traditional and more conservative masculine values.<sup>16</sup> Hence, messages that define caregiving within the realm of masculinity, such as those posited in Hanlon’s framework of caring masculinities<sup>77</sup>, need to be popularized to ensure men perform care with a peace of mind. Finally, as men are generally more reluctant than women to seek out support in the course of caregiving,<sup>1,16</sup> employers and policy decisionmakers need to adopt an active approach to identify men who assume at least weekly or primary caregiver roles as they are likely subject to higher risks of work-life imbalance.

Research agencies in LMICs might consider establishing large population-based cohorts to allow for nationally representative analyses on caregiving and labour market outcomes. Ideally, the survey instruments need to be comparable with that of existing studies, such as the American HRS, the Chinese CHARLS or the European SHARE, to enable cross-country comparisons. Several years of follow-up on the cohort would allow for more sophisticated longitudinal analyses to assess the time trends of caregiving and labour supply, although repeated cross-sectional datasets would also be valuable. An alternative to creating new cohorts is to enhance the national census with items on caregiving and labour work, as seen in the Census for England and Wales.<sup>60</sup>

## **Study limitations**

Our study has several limitations. First, selection bias may arise from restricting studies to be those published in English. Hence, future researchers might wish to remove the language restriction in their search to conduct a more comprehensive synthesis. Second, the small number of studies has precluded us to perform a meta-analysis on some occasions or lead to insufficient statistical power on others. For example, we only identified two studies on intensive caregivers and thus did not conduct a meta-analysis. Furthermore, using the results of three studies, we demonstrated that LFP was negatively associated with being a primary caregiver. Despite the small number of studies, it is worth stressing that all three studies agreed on a significantly reduced LFP among primary caregiving men. Hence, we deem the results of the meta-analysis to be plausible as primary caregiving is likely to lead to a lower LFP for men.

Third, while there is a lack of consensus in the literature on the definition of each type of caregiving, we used specific definitions of any, daily, primary and intensive caregivers in this work.<sup>17-19</sup> While our findings are potentially sensitive to the definitions employed, we adopted definitions that are commonplace in the literature. It is clear that more standardization on such definitions would facilitate the performance of robust meta-analyses. Fourth, we did not examine labour outcomes of men beyond LFP, such as hours of work or hourly wages. The labour decision of individuals is commonly modeled as a two-part process, wherein individuals first decide whether or not to work, and conditional on the decision to work, they select the hours of work based on the principle of equimarginal returns, i.e.,

where the gain in the utility from enhanced income just offsets the marginal utility of leisure.<sup>33</sup> Hence, we believe our work to represent an important first step in the evidence synthesis literature to understand how men balance caregiving and paid work. And finally, none of the studies in this review used data collected during the coronavirus pandemic. Therefore, we were unable to account for the potentially enlarged wealth gap between HICs and LMICs and other outcomes caused by the pandemic.<sup>78</sup> Hence, future researchers need to revisit this topic by using more recent data to reflect these impacts.

## Conclusions

This systematic review and meta-analysis found men who were weekly, daily or primary caregivers to have a lower LFP rate than their counterparts. Although we did not find country type to moderate the association between caregiving and men's LFP, these results may be due to the paucity of studies from LMICs. Our findings support the design of tailored policies to retain employees who simultaneously assume weekly, daily or primary caregiver roles. In order to gain a more comprehensive understanding on the labour market consequences of caregiving, research agencies in LMICs are encouraged to consider the establishment of large population-based cohort studies of caregiving and its impact on various labour market outcomes using instruments that are comparable to those of existing studies that address health and ageing.

## Declarations

### Competing Interests:

The authors declare no competing interests. This work received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## References

1. Kramer BJ, Thompson Jr EH. *Men as Caregivers*. 1st edition. Prometheus; 2004.
2. OECD. Women are well-represented in health and long-term care professions, but often in jobs with poor working conditions. OECD Gender Data Portal. Published March 2019. Accessed March 27, 2021. <https://www.oecd.org/gender/data/women-are-well-represented-in-health-and-long-term-care-professions-but-often-in-jobs-with-poor-working-conditions.htm>
3. National Alliance for Caregiving, AARP. *Caregiving in the U.S. 2020 Report*; 2020. Accessed March 27, 2021. <https://www.caregiving.org/wp-content/uploads/2021/01/full-report-caregiving-in-the-united-states-01-21.pdf>
4. Hinton T. Number of informal carers in Australia in 2020, by gender and type. Statista. Published November 19, 2020. Accessed March 27, 2021. <https://www.statista.com/statistics/1178782/australia-number-of-informal-carers-by-gender/>
5. Tur-Sinai A, Teti A, Rommel A, Hlebec V, Lamura G. How many older informal caregivers are there in Europe? Comparison of estimates of their prevalence from three European surveys. *International Journal of Environmental Research and Public Health*. 2020;17:9531. doi:10.3390/ijerph17249531
6. OECD. *OECD Labour Force Statistics 2020*. OECD Publishing; 2020.
7. International Labour Organization. *A Quantum Leap for Gender Equality: For a Better Future of Work for All*. International Labour Organization; 2019. Accessed March 26, 2021. [https://www.ilo.org/wcmsp5/groups/public/-dgreports/-dcomm/-publ/documents/publication/wcms\\_674831.pdf](https://www.ilo.org/wcmsp5/groups/public/-dgreports/-dcomm/-publ/documents/publication/wcms_674831.pdf)
8. Bremer P, Challis D, Hallberg IR, et al. Informal and formal care: Substitutes or complements in care for people with dementia? Empirical evidence for 8 European countries. *Health Policy*. 2017;121(6):613-622. doi:10.1016/j.healthpol.2017.03.013
9. Sun Z, Guerriere DN, de Oliveira C, Coyte PC. Does informal care impact utilisation of home-based formal care services among end-of-life patients? A decade of evidence from Ontario, Canada. *Health Soc Care Community*. 2019;27(2):437-448. doi:10.1111/hsc.12664
10. Ortiz-Ospina E, Tzvetkova S. Working women: key facts and trends in female labor force participation. Our World in Data. Published October 16, 2017. Accessed March 27, 2021. <https://ourworldindata.org/female-labor-force-participation-key-facts>
11. Repetto R. Son preference and fertility behavior in developing countries. *Studies in Family Planning*. 1972;3(4):70-76. doi:10.2307/1965363

12. Kugler AD, Kumar S. Preference for boys, family size, and educational attainment in India. *Demography*. 2017;54(3):835-859. doi:10.1007/s13524-017-0575-1
13. Ritchie H, Roser M. Gender Ratio. *Our World in Data*. Published online June 13, 2019. Accessed February 12, 2021. <https://ourworldindata.org/gender-ratio>
14. Standing Committee of the National People's Congress. *Law of the People's Republic of China on Protection of the Rights and Interests of the Elderly*; 2012. Accessed October 5, 2020. <http://www.ilo.org/dyn/natlex/docs/ELECTRONIC/92671/126615/F-1741948415/CHN92671%202012.pdf>
15. Baker KL, Robertson N. Coping with caring for someone with dementia: reviewing the literature about men. *Ageing and Mental Health*. 2008;12(4):413-422. doi:10.1080/13607860802224250
16. Robinson CA, Bottorff JL, Pesut B, Oliffe JL, Tomlinson J. The male face of caregiving: a scoping review of men caring for a person with dementia. *Am J Mens Health*. 2014;8(5):409-426. doi:10.1177/1557988313519671
17. Lilly MB, Laporte A, Coyte PC. Labor market work and home care's unpaid caregivers: a systematic review of labor force participation rates, predictors of labor market withdrawal, and hours of work. *Milbank Q*. 2007;85(4):641-690. doi:10.1111/j.1468-0009.2007.00504.x
18. Bauer JM, Sousa-Poza A. Impacts of informal caregiving on caregiver employment, health, and family. *Journal of Population Ageing*. 2015;8(3):113-145. doi:10.1007/s12062-015-9116-0
19. Moussa MM. The relationship between elder caregiving and labour force participation in the context of policies addressing population ageing: a review of empirical studies published between 2006 and 2016. *Ageing and Society*. 2018;39(6). doi:10.1017/S0144686X18000053
20. Keating NC, Fast JE, Lero DS, Lucas SJ, Eales J. A taxonomy of the economic costs of family care to adults. *The Journal of the Economics of Ageing*. 2014;3(C):11-20.
21. Becker GS. Human Capital, Effort, and the Sexual Division of Labor. *Journal of Labor Economics*. 1985;3(1):S33-S58. Accessed February 2, 2021. <http://www.jstor.org/stable/2534997>
22. Becker GS. *A Treatise on the Family*. Harvard University Press; 1993.
23. Lundberg S, Pollak RA. Bargaining and distribution in marriage. *Journal of Economic Perspectives*. 1996;10(4):139-158. doi:10.1257/jep.10.4.139
24. Mincer J. *Labor Force Participation of Married Women: A Study of Labor Supply*. National Bureau of Economic Research; 1962. Accessed March 26, 2021. <https://www.nber.org/books-and-chapters/aspects-labor-economics/labor-force-participation-married-women-study-labor-supply>
25. Gronau R. The effect of children on the housewife's value of time. *Journal of Political Economy*. 1973;81(2, Part 2: New Economic Approaches to Fertility):S168-S199. Accessed March 28, 2021. <https://www.jstor.org/stable/1840419>
26. Gronau R. The intrafamily allocation of time: the value of housewives' time. *American Economic Review*. 1973;63(4):634-651. Accessed March 28, 2021. <https://www.jstor.org/stable/1808854>
27. Heckman JJ. Shadow prices, market wages and labor supply. *Econometrica*. 1974;42:679-694.
28. Becker GS. A Theory of the Allocation of Time. *The Economic Journal*. 1965;75(299):493-517. doi:10.2307/2228949
29. Becker GS. Altruism in the Family and Selfishness in the Market Place. *Economica*. 1981;48(189):1-15. doi:10.2307/2552939
30. Gronau R. Leisure, home production, and work—the theory of the allocation of time revisited. *Journal of Political Economy*. 1977;85(6):1099-1123. doi:10.3386/w0137
31. Becker GS, Ghez G. *The Allocation of Time and Goods over the Lifecycle*. Columbia University Press; 1975.
32. Heckman JJ. A life cycle model of earnings, learning and consumption. *Journal of Political Economy*. 1976;84(4, Part 2: Essays in Labor Economics in Honor of H. Gregg Lewis):S11-S44. Accessed March 26, 2021. <https://www.jstor.org/stable/1831101>
33. Van Houtven CH, Carmichael F, Jacobs J, Coyte P. The economics of informal care. In: *Oxford Research Encyclopedia of Economics and Finance*. Oxford University Press; 2019. Accessed January 1, 2021. <https://oxfordre.com/economics/view/10.1093/acrefore/9780190625979.001.0001/acrefore-9780190625979-e-265>
34. Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. *JAMA*. 2000;283(15):2008-2012. doi:10.1001/jama.283.15.2008

35. Greenhalgh T, Peacock R. Effectiveness and efficiency of search methods in systematic reviews of complex evidence: audit of primary sources. *BMJ*. 2005;331(7524):1064-1065. doi:10.1136/bmj.38636.593461.68
36. Kolodziej IWK, Reichert AR, Schmitz H. New evidence on employment effects of informal care provision in Europe. *Health Serv Res*. 2018;53(4):2027-2046. doi:10.1111/1475-6773.12840
37. Van Houtven CH, Coe NB, Skira MM. The effect of informal care on work and wages. *Journal of Health Economics*. 2013;32(1):240-252. doi:10.1016/j.jhealeco.2012.10.006
38. Greene WH. *Marginal Effects in the Bivariate Probit Model*. Social Science Research Network; 1996. Accessed March 25, 2021. <https://papers.ssrn.com/abstract=1293106>
39. Hartung J, Knapp G. A refined method for the meta-analysis of controlled clinical trials with binary outcome. *Stat Med*. 2001;20(24):3875-3889. doi:10.1002/sim.1009
40. Egger M, Smith GD, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. *BMJ*. 1997;315(7109):629-634. doi:10.1136/bmj.315.7109.629
41. Mathur MB, VanderWeele TJ. Robust metrics and sensitivity analyses for meta-analyses of heterogeneous effects. *Epidemiology*. 2019;in press.
42. Mathur MB, VanderWeele TJ. New metrics for meta-analyses of heterogeneous effects. *Statistics in Medicine*. 2019;38(8):1336-1342. doi:10.1002/sim.8057
43. The World Bank Group. World Bank Country and Lending Groups. Published online June 2020. Accessed February 11, 2021. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>
44. Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *European Journal of Epidemiology*. 2010;25(9):603-605. Accessed March 22, 2021. <https://hal.archives-ouvertes.fr/hal-00610427/document>
45. Chai H, Fu R, Coyte PC. Unpaid caregiving and labor force participation among Chinese middle-aged adults. *International Journal of Environmental Research and Public Health*. 2021;18(2):641. doi:10.3390/ijerph18020641
46. Wang Y, Zhang C. Gender inequalities in labor market outcomes of informal caregivers near retirement age in urban China. *Feminist Economics*. 2018;24(2):147-170.
47. Magnani E, Rammohan A. Ageing and the family in Indonesia: an exploration of the effect of elderly care-giving on female labor supply. *Journal of Income Distribution*. 2009;18(3):110-130.
48. Hohmeyer K, Kopf E. Caught between two stools? Informal care provision and employment among welfare recipients in Germany. *Ageing and Society*. 2018;40(1):162-187. doi:10.1017/S0144686X18000806
49. Lee Y, Tang F, Kim KH, Albert SM. Exploring gender differences in the relationships between eldercare and labour force participation. *Can J Aging*. 2015;34(1):14-25. doi:10.1017/S0714980814000543
50. Lee Y, Tang F. More caregiving, less working: caregiving roles and gender difference. *J Appl Gerontol*. 2015;34(4):465-483. doi:10.1177/0733464813508649
51. Coe NB, Skira M, Van Houtven C. Do couples self-insure? The effect of informal care on a couple's labor supply. *SSRN Journal*. Published online 2011. doi:10.2139/ssrn.1956005
52. Kitamura T, Adachi Y, Uemura T. Effect of Caregiving on Employment for Senior Workers in Japan. *Ageing Int*. Published online June 27, 2020. doi:10.1007/s12126-020-09377-8
53. Vangen H. The impact of informal caregiving on labour supply before and after a parent's death. *Population Ageing*. Published online April 30, 2020. doi:10.1007/s12062-020-09279-2
54. Do YK. *The Effect of Informal Caregiving on Labor Market Outcomes in South Korea*. Asia Health Policy Program Working Paper No. 1.; 2008. Accessed October 7, 2020. <https://dx.doi.org/10.2139/ssrn.1657084>
55. Nguyen HT, Connelly LB. The effect of unpaid caregiving intensity on labour force participation: Results from a multinomial endogenous treatment model. *Social Science & Medicine*. 2014;100:115-122. doi:10.1016/j.socscimed.2013.10.031
56. Floridi G. Daily grandchild care and grandparents' employment: a comparison of four European child-care policy regimes. *Ageing and Society*. Published online July 29, 2020:1-32. doi:10.1017/S0144686X20000987
57. Heger D, Korfhage T. Short- and medium-term effects of informal eldercare on labor market outcomes. *Feminist Economics*. 2020;26(4):205-227. doi:10.1080/13545701.2020.1786594

58. Ciccarelli N, Van Soest A. Informal caregiving, employment status and work hours of the 50+ population in Europe. *De Economist*. 2018;166(3):363-396. doi:10.1007/s10645-018-9323-1
59. Leigh A. Informal care and labor market participation. *Labour Economics*. 2010;17(1):140-149. doi:10.1016/j.labeco.2009.11.005
60. Drinkwater S. Informal caring and labour market outcomes within England and Wales. *Regional Studies*. 2015;49(2):273-286. doi:10.1080/00343404.2013.766320
61. Yamada H, Shimizutani S. Labor market outcomes of informal care provision in Japan. *The Journal of the Economics of Ageing*. 2015;6(C):79-88. Accessed February 16, 2021. [http://econpapers.repec.org/article/eeejoecag/v\\_3a6\\_3ay\\_3a2015\\_3ai\\_3ac\\_3ap\\_3a79-88.htm](http://econpapers.repec.org/article/eeejoecag/v_3a6_3ay_3a2015_3ai_3ac_3ap_3a79-88.htm)
62. Watts M. *The Impact of the Provision of Informal Care on Australian Labour Force Participation Behaviour*. Centre of Full Employment and Equity, the University of Newcastle; 2010:28. Accessed March 25, 2021. <http://www.fullemployment.net/publications/wp/2010/10-02.pdf>
63. Bolin K, Lindgren B, Lundborg P. Your next of kin or your own career? *Journal of Health Economics*. 2008;27(3):718-738. doi:10.1016/j.jhealeco.2007.10.004
64. Meng A. Informal home care and labor-force participation of household members. *Empir Econ*. 2013;44(2):959-979. doi:10.1007/s00181-011-0537-1
65. Carmichael F, Charles S, Hulme C. Who will care? Employment participation and willingness to supply informal care. *Journal of Health Economics*. 2010;29(1):182-190. doi:10.1016/j.jhealeco.2009.11.003
66. King D, Pickard L. When is a carer's employment at risk? Longitudinal analysis of unpaid care and employment in midlife in England: When is a carer's employment at risk? *Health & Social Care in the Community*. 2013;21(3):303-314. doi:10.1111/hsc.12018
67. Gomez-Leon M, Evandrou M, Falkingham J, Vlachantoni A. The dynamics of social care and employment in mid-life. *Ageing and Society*. 2017;39(2):381-408. doi:10.1017/S0144686X17000964
68. Carr E, Murray ET, Zaninotto P, et al. The association between informal caregiving and exit From employment among older workers: prospective findings from the UK Household Longitudinal Study. *GERONB*. Published online December 7, 2016:gbw156. doi:10.1093/geronb/gbw156
69. Proulx C, Le Bourdais C. Impact of providing care on the risk of leaving employment in Canada. *Can J Aging*. 2014;33(4):488-503. doi:10.1017/S0714980814000452
70. Raab R. *Retirement and Informal Care-Giving: Behavioral Patterns among Older Workers*. Joint Research Centre, European Commission (Ispra site); 2017. Accessed February 16, 2021. <http://econpapers.repec.org/paper/jrswpaper/201708.htm>
71. Meng A. Informal caregiving and the retirement decision. *German Economic Review*. 2012;13(3):307-330. doi:10.1111/j.1468-0475.2011.00559.x
72. Jacobs JC, Laporte A, Van Houtven CH, Coyte PC. Caregiving intensity and retirement status in Canada. *Social Science & Medicine*. 2014;102:74-82. doi:10.1016/j.socscimed.2013.11.051
73. Stabile M, Laporte A, Coyte PC. Household responses to public home care programs. *Journal of Health Economics*. 2006;25(4):674-701. doi:10.1016/j.jhealeco.2005.03.009
74. Magaña I, Martínez P, Loyola M-S. Health outcomes of unpaid caregivers in low- and middle-income countries: A systematic review and meta-analysis. *Journal of Clinical Nursing*. 2020;29(21-22):3950-3965. doi:https://doi.org/10.1111/jocn.15450
75. World Bank Group. *Women, Business and the Law 2021*. The World Bank Group; 2021. Accessed March 27, 2021. <https://openknowledge.worldbank.org/bitstream/handle/10986/35094/9781464816529.pdf>
76. Hong S-C, Coogler CL. Spousal caregiving for partners with dementia: a deductive literature review testing Calasanti's gendered view of care work. *J Appl Gerontol*. 2016;35(7):759-787. doi:10.1177/0733464814542246
77. Hanlon N. *Masculinities, Care and Equality: Identity and Nurture in Men's Lives*. Palgrave Macmillan; 2012.
78. Lee S, Schmidt-Klau D, Verick S. The labour market impacts of the COVID-19: a global perspective. *The Indian Journal of Labour Economics*. 2020;63:11-15. doi:10.1007/s41027-020-00249-y

## Tables

**Table 1. Characteristics of the 31 studies assessing men's care provision and labour force participation**

First author, year	Place of data origin	Study design	Study cohort	N	Age group	Care recipients assessed	Outcomes examined
Leigh 2010	Australia	Longitudinal	HILDA	4865	25-64	Parents/in-law/spouse/adult relatives	LFP
Nguyen 2014	Australia	Cross-sectional	HILDA	3733	25-64	Household members with long-term health conditions, disability or older age	LFP
Watts 2008*	Australia	Cross-sectional	SDAC	11813	15-64	Sick/disabled/elderly	LFP
Jacobs 2014	Canada	Cross-sectional	GSS	2966	55-69	Not specified	Retired
Lilly 2010	Canada	Cross-sectional	GSS	5448	45+	Family members/friends 65+	LFP
Proulx 2014	Canada	Longitudinal	GSS	2051	45+	Parents/in-law/spouse/another relative or non-relative	Work exit
Chai 2021	China	Cross-sectional	CHARLS	2268	45-60	Parents/in-law; grandchildren	LFP
Wang 2018	China	Cross-sectional	CHARLS	2341	45-65	Parents/in-law/grandchildren	LFP
Bolin 2008	Europe	Longitudinal	SHARE	883	50-69	Parents/in-law	LFP
Ciccarelli 2018	Europe	Longitudinal	SHARE	3218	50-69	Parents/in-law/grandparents	LFP
Kolodziej 2018	Europe	Longitudinal	SHARE	8111	20-64	Parents	LFP
Floridi 2020	Europe	Longitudinal	SHARE	7393	50-69	Grandchildren	LFP
Heger 2020	Europe	Longitudinal	SHARE	6752	50-69	Parents/in-law	LFP
Raab 2017*	Europe	Longitudinal	SHARE	4939	55-70	Not specified (both in and out of household)	Retired
Hohmeyer 2018	Germany	Longitudinal	PASS	8386	25-64	Not specified	LFP
Meng 2011	Germany	Longitudinal	SOEP	1190	58-65	Not specified ("help with household tasks")	Retired
Meng 2013	Germany	Longitudinal	SOEP	6195	36-64	Not specified ("persons in need of care")	LFP
Magnani 2009	Indonesia	Longitudinal	IFLS	7896	25+	Elders 50+ at home	LFP
Kitamura 2020	Japan	Longitudinal	Longitudinal Survey of Middle-aged and Elderly Persons of MHLW	6393	50-59	Parents	LFP
Yamada 2015	Japan	Cross-sectional	CSTL	9707	40-60	Parents	LFP
Do 2008*	Korea	Longitudinal	KLoSA	2278	45-64	Parents/in-law/children/siblings/ spouse	LFP
Vangen 2020	Norway	Longitudinal	NorLAG	265	40-66	A lone parent around the time of death	LFP

First author, year	Place of data origin	Study design	Study cohort	N	Age group	Care recipients assessed	Outcomes examined
Carmichael 2010	UK	Longitudinal	BHPS	6274	19-64	Sick/disabled/elderly	Work exit
Carr 2016	UK	Longitudinal	Understanding Society	3886	50-75	Sick/disabled/elderly	Work exit
Drinkwater 2015	UK	Cross-sectional	Census for England and Wales	768125	16-64	Sick/disabled/elderly	LFP
King 2013	UK	Longitudinal	ELSA	3495	50-65	Any adult care recipients	Work exit
Gomez-Leon 2017	UK	Longitudinal	NCDS	3013	50-55	Parents/in-law	Work exit
Coe 2011*	USA	Longitudinal	HRS	3411	45-70	Parents/in-law	LFP, retired
Lee & Tang, 2015	USA	Cross-sectional	HRS	1441	50-61	Parents/spouse/grandchildren	LFP
Lee 2015	USA	Longitudinal	HRS	2062	51+	Parents/in-law	LFP
Van Houtven 2013	USA	Longitudinal	HRS	3896	51-61	Parents/in-law	LFP, retired

**Abbreviations.** LFP, labour force participation; CHARLS, China Health and Retirement Longitudinal Study; SHARE, The Survey of Health, Ageing and Retirement in Europe; BHPS, The British Household Panel Survey; HRS, Health and Retirement Study; KLoSA, Korean Longitudinal Study of Ageing; PASS, The Panel Labour Market and Social Security; GSS, General Social Survey; ELSA, The English Longitudinal Study of Ageing; MHLW, The Ministry of Health, Labour and Welfare; HILDA, Household, Income and Labour Dynamics in Australia survey; NCDS, National Child Development Study. IFLS, Indonesian Family Life Survey; GSS, General Social Survey; SOEP, The German Socio-Economic Panel Study; NorLAG, The Norwegian Life course, Ageing and Generation study; SDAC, Survey of Disability, Ageing and Carers; CSTL, Comprehensive Survey of Living Conditions.

\*Working papers.

**Table 2. Summary of results on the relationship between caregiving and labour force participation of men (23 studies)**

Measure CG	ME (SE or 95% CI or p-value)	Care recipients	N	Method	Test for the endogeneity of caregiving	Sources
<b><i>Weekly provision of care</i></b>						
Any CG	-0.038 (0.055)	Family members or friends aged 65+	5448	Probit	NA	Lilly (2010) GSS
Any CG‡	-0.0064 (0.0114)	Parents	3411	LPM†	IVs were the survival, widowed and health status of parents.	Coe (2011) HRS
Any CG‡	-0.0009 (0.008)	Parents	3896	LPM†	IVs were the survival, widowed and health status of parents.	Van Houtven (2013) HRS
Any CG‡	OR=0.84 (0.60 to 1.17) assuming one caregiver role  OR=0.63 (0.30 to 1.34) assuming two caregiver roles	Parents, spouse or grandchildren	2062	Logit	Odds ratios only.	Lee (2015) HRS
Any CG	-0.059 (0.017)	Parents	6393	LPM†	IVs were the survival status and care condition of the parents	Kitamura (2020) MHLW
Any CG	-0.120 (0.101)	Grandchildren only	2341	IV 2SLS	IVs were the presence of grandchildren aged below 16, survival and health statuses of parents, and the presence of a nursing home in the community	Wang (2018) CHARLS
Any CG	0.114 (0.123)	Parents only	2341	IV 2SLS	Same as above	Wang (2018) CHARLS
Any CG	-0.307 (0.373)	Both grandchildren and parents	2341	IV 2SLS	Same as above	Wang (2018) CHARLS
Any CG	0.740 (0.470)	Co-resident household members aged 50+	7896	IV Probit	Selection bias of co-resident decision was modeled in a Heckman procedure.	Magnani (2009) IFLS
Any CG	OR=0.668 (0.456 to 0.978)	Not specified	8386	Logit	Odds ratios only.	Hohmeyer (2018) PASS
Any CG¶	0.0360 (0.00852)	A lone parent around the time of death	265	LPM	Yearly based marginal effect estimates were pooled using an inverse-variance weighted fixed-effects model.	Vangen (2020) NorLAG
Any personal CG‡	-0.0320 (0.0161)	Parents	3411	LPM†	IVs were the survival, widowed and health status of parents.	Coe (2011) HRS
Any personal CG‡	-0.024 (0.011)	Parents	3896	LPM†	IVs were the survival, widowed and health status of parents.	Van Houtven (2013) HRS

Measure CG	ME (SE or 95% CI or p-value)	Care recipients	N	Method	Test for the endogeneity of caregiving	Sources
Any chore CG‡	-0.005 (0.009)	Parents	3896	LPM†	Same as above	Van Houtven (2013) HRS
CG 1-10h/wk	0.01 (0.0796)	Family members aged 10+	2278	Probit†	IVs were the health status of parents/in-law/siblings.	Do (2008) KLoSA
<b><i>Being daily caregivers</i></b>						
Daily CG	-0.06 (0.02)	Household members	3733	Probit†	IVs were the survival, health and location of parents	Nguyen (2014) HILDA
Daily CG	-0.089 (0.066)	Grandchildren aged below 14	7393	Bivariate probit		Floridi (2020) SHARE
Daily CG	-0.076 (0.027)	Parents	6752	LPM†	IVs were the number of sisters and health status of parents	Heger (2020) SHARE
Daily CG	-0.035 (0.046)	Parents	3218	GMM	IVs were the survival and health statuses of parents and proximity to children	Ciccarelli (2018) SHARE
Daily personal CG	-0.321 (0.124) #	Parents	8111	2SLS	IVs were the widowed status of parents and the number of siblings.	Kolodziej (2018) SHARE
Daily personal CG	OR=0.69 (0.46 to 1.03) from 2006 to 2008§  OR=1.02 (0.80 to 1.29) from 2008 to 2010§	Parents	1441	Cross-lagged panel model	Odds ratios only.	Lee & Tang (2015) HRS
Daily CG	-0.07 (0.02)	Co-resident household members	3733	Probit†	IVs were the survival, health and location of parents	Nguyen (2014) HILDA
CG>10h/wk	-0.060 (0.028)	Parents, spouse, or other relatives	4865	LPM	NA	Leigh (2010) HILDA
CG >10h/wk	-0.117 (0.0875)	Family members aged 10+	2278	Probit†	IVs were the health status of parents/in-law/siblings.	Do (2008) KLoSA
CG >10h/wk	OR=0.518 (0.219-0.924)	Not specified	8386	Logit	NA	Hoheyer (2018) PASS
CG 10-49h/wk	-0.089 (0.008)	Family, friends, neighbors, or others	768125	Probit	NA	Drinkwater (2015)

Measure CG	ME (SE or 95% CI or p-value)	Care recipients	N	Method	Test for the endogeneity of caregiving	Sources
CG>1000h/2y	-0.005 (0.02)	Parents	3896	LPM†	IVs were the survival, widowed and health status of parents.	Van Houtven (2013) HRS
<b><i>Being primary caregivers</i></b>						
Primary CG	-0.202 (0.091)	Parents	9707	IV 2SLS	IVs were age, gender, health of parents; and the presence of a sibling that lives close by	Yamada (2015) CSTL
Primary CG	-0.12 (0.02)	Household members	3733	Probit†	IVs were the survival, health and location of parents	Nguyen (2014) HILDA
Primary CG	-0.068 (0.013)	Household members	11813	IV probit	IVs were the disability, needs for assistance, and self-reliance capacity of household members	Watts (2008) SDAC
<b><i>Intensive caregiving beyond 15 hours per week</i></b>						
CG 1-19h/wk	-0.028 (0.0686)	Family members aged 10+	2278	Probit†	IVs were the ADL status of parents/in-law/siblings.	Do (2008) KLoSA
CG>=20h/wk	-0.093 (0.0934)	Ditto	2278	Probit†	Same as above	Do (2008) KLoSA
CG 1-20h/wk	0.002(0.003)	Family, friends, neighbors, or others	768125	Probit	NA	Drinkwater (2015)
CG>50h/wk	-0.249 (0.008)	Family, friends, neighbors, or others	768125	Probit	NA	Drinkwater (2015)
<b><i>Hours of caregiving per week</i></b>						
Per h of CG	-0.010 (0.014)	Parents	883	Probit	IVs were not used for men	Bolin (2008) SHARE
Per h of CG	-0.006 (0.006)	Family members	6195	Logit†	IVs were the health status of family members	Meng (2013) SOEP
Per h of CG	-0.00119 (0.000523) before 72h/wk -0.00349 (p>0.1) after 72h/wk	Parents or grandchildren	2268	Probit†	IVs were the number of grandchildren aged below 16 and the widowed status of father/father-in-law	Chai (2021) CHARLS
Per h of CG	0.0218 (0.0120) before 70h/wk 0.0652 (p<0.05) after 70h/wk	Parents	2268	Probit†	Same as above	Chai (2021) CHARLS

Measure CG	ME (SE or 95% CI or p-value)	Care recipients	N	Method	Test for the endogeneity of caregiving	Sources
Per h of CG	-0.00199 (0.000627) before 72h/wk  -0.00465 (p<0.1) after 72h/wk	Grandchildren	2268	Probit†	Same as above	Chai (2021) CHARLS
Per h of CG	-0.059 (p>0.1) any work*  -0.022 (p>0.1) employed work*	Family members aged 10+	2278	Probit†	IVs were health status of parents/in-law/siblings.	Do (2008) KLoSA

† Because the study failed to reject the exogeneity of caregiving, the regression results were estimated without the use of instrumental variables.

‡ At least 100 hours of caregiving over the past 2 years.

¶ Cared for a lone parent near the end of life.

§ Calculated from log-odds ratio of -0.368 (SE=0.205) and 0.018 (SE=0.120).

\* Caregiving hours were entered as  $\ln(\text{caregiving hours}+1)$  in regression.

# Estimates obtained from the authors.

**Abbreviations.** CG, caregiving; h, hour; wk, week; IV, instrumental variables; ME, marginal effect; SE, standard error; CI, confidence intervals; LPM, linear probability model; 2SLS, two-stage least squares; GMM, generalized methods of moment.

**Table 3. Summary of results on the relationship between caregiving and work exit of employed men (5 studies)**

Measure CG	Timing of work exit	Effect sizes (CI or p-value)	Employed men characteristics	N	Sources
<b><i>Becoming a new caregiver</i></b>					
Any types of new caregiver	In the same year	OR=1.22 (0.97-1.46)	19-65 y	6274	Carmichael (2010) BHPS
	In 5 years	OR=1.03 (0.68-1.57)	50 y	3013	Gomez-Leon (2017) NCDS
New resident caregiver	In the same year	OR=1.61 (1.02-2.20)	19-65 y	5796	Carmichael (2010) BHPS
New non-resident caregiver		OR=1.00 (0.70-1.30)			
CG 1-10h/wk	In the same year	OR=0.93 (0.15-1.70) ‡	50-62y	3495	King (2013) ELSA
	By next year	OR=1.08 (0.55-2.13)	50-75 y PT	550	Carr (2016)
CG >10h/wk	By next year	OR=0.97 (0.69-1.38)	50-75 y FT	3336	Carr (2016)
	In the same year	OR=0.97 (0.69-1.38)	50-62 y	3495	King (2013) ELSA
	By next year	OR=1.47 (0.32-2.62) ‡	50-75 y FT	6252	Carr (2016)
	By next year	OR=1.24 (0.41-3.75)			Carr (2016)
		OR=1.60 (0.90-2.83)			
CG <20h/wk	In the same year	OR=1.11 (0.80-1.41)	19-65 y	6252	Carmichael (2010) BHPS
CG 20+h/wk	In the same year	OR=2.29 (0.67-3.89)			
Being a new caregiver or did not increase CG hours from 5 y ago	In 5 years	OR=0.79 (0.57-1.12)	50 y	3013	Gomez-Leon (2017) NCDS
Increased >5 h/wk of CG from 5 y ago	In 5 years	OR=1.65 (0.99-2.72)	50 y	3013	Gomez-Leon (2017) NCDS
Continuous caregiver	In 5 years	OR=0.81 (0.57-1.16)	50 y	3013	Gomez-Leon (2017) NCDS
<b><i>Tasks of caregiving</i></b>					
Personal caregiving combined	In 5 years	OR=1.06 (0.57-1.98)	50 y	3013	Gomez-Leon (2017) NCDS
Basic caregiving combined	In 5 years	OR=1.14 (0.77-1.69)	50 y	3013	Gomez-Leon (2017) NCDS
Instrumental caregiving only	In 5 years	OR=0.84 (0.61-1.16)	50 y	3013	Gomez-Leon (2017) NCDS
<b><i>Recipients of caregiving</i></b>					
Spouse	In 2006	HR=1.21 (p>0.1)	44-79 y†	2051	Proulx (2014) GSS
	By next year	OR=0.71 (0.27-1.88)	50-75 y PT	550	Carr (2016)
	By next year	OR=0.71 (0.27-1.88)	50-75 y FT	3336	Carr (2016)
		OR=1.41 (0.86-2.29)			

Parents/in-law and/or grandparents	In 2006	HR=1.15 (p>0.1)	44-79 y†	2051	Proulx (2014) GSS
	By next year		50-75 y PT	550	
	By next year	OR=0.98 (0.55-1.76)	50-75 y FT	3336	Carr (2016)
		OR=1.07 (0.83-1.39)			Carr (2016)
Others	In 2006¶	HR=0.76 (p>0.1)	44-79 y†	2051	Proulx (2014) GSS
	In 2006#		44-79 y†	2051	
	By next year §	HR=1.36 (p>0.1)	50-75 y PT	550	Proulx (2014) GSS
		OR=0.99 (0.51-1.93)	50-75 y FT	3336	Carr (2016)
	By next year §				Carr (2016)
		OR=1.07 (0.76-1.50)			

† Individuals with at least one employment >6 month after schooling were included.

‡ The original paper reported the odds ratio of being employed relative to leaving employment. The reciprocal odds ratios were computed using the following formula: point estimate=1/OR with standard error=(1/OR)<sup>2</sup>SE(OR) using the delta method.

¶ Recipient is a relative that is not the spouse or the parent of the caregiver.

§ Recipient is anyone that is not the spouse or partner or parent or grandparent of the caregiver.

# Recipient is a non-relative of the caregiver.

Carmichael (2010), Carr (2016) and King (2013) assessed caregiving provided to anyone who was sick, elderly or disabled. Gomez-Leon (2017) studied parents or parents-in-law as the care recipients, while Proulx (2014) assessed care given to parents, grandparents, spouse, another relative or non-relative.

OR, odds ratio; CI, confidence intervals; HR, hazard ratio.; PT, part-time; FT, full-time; y, year; h, hour; wk, week; CG, caregiving.

**Table 4. Summary of results on the relationship between caregiving and retirement of employed men (5 studies)**

Measure CG	Effect sizes (SE or 95% CI)	N	Sources
<b><i>Any caregiving</i></b>			
Any CG	ME=-0.0030 (0.0296)	2362	Coe (2011) HRS
Any CG	ME=0.041 (0.0107)	4939	Raab (2017) SHARE
Any CG	ME=0.016 (0.009)	3975	Van Houtven (2013) HRS
Any CG	HR=4.57 (2.76 to 7.57) †	1190	Meng (2011) SOEP
<b><i>Recipients and/or tasks of caregiving</i></b>			
Personal CG	ME=-0.0171 (0.0489)	2733	Coe (2011) HRS
Personal CG	ME=0.015 (0.012)	3975	Van Houtven (2013) HRS
Chore CG	ME=0.016 (0.01)	3975	Van Houtven (2013) HRS
Personal CG for the spouse	ME=0.0378 (0.0387)	2733	Coe (2011) HRS
Spouse CG	ME=0.0145 (0.0301)	2362	Coe (2011) HRS
<b><i>Location of caregiving</i></b>			
Resident CG	HR=1.11 (0.37 to 3.35) †	1190	Meng (2011) SOEP
Non-resident CG	HR=0.99 (0.53 to 1.83) †	1190	Meng (2011) SOEP
Hours of resident CG	HR=1.03 (0.98 to 1.09) †	1190	Meng (2011) SOEP
Hours of non-resident CG	HR=1.02 (0.96 to 1.09) †	1190	Meng (2011) SOEP
<b><i>Hours of caregiving</i></b>			
CG 0-5 h/wk	RRR=1.52 (1.05 to 1.99) ‡	2966	Jacobs (2014) GSS
CG 5-14.9 h/wk	RRR=0.90 (0.51 to 1.29) ‡	2966	Jacobs (2014) GSS
CG 15+ h/wk	RRR=2.93 (0.19 to 5.67) ‡	2966	Jacobs (2014) GSS
CG>1000 h/2 y	ME=0.018 (0.024)	3975	Van Houtven (2013) HRS
Per hour of CG	HR=1.03 (0.99 to 1.07) †	1190	Meng (2011) SOEP

† Computed from log-hazard ratio estimates.

‡ The relative risk ratio measures the probability of being fully retired over the probability of not being fully employed.

**Abbreviations:** ME, marginal effect; HR, hazard ratio; RRR, relative risk ratio; CG, caregiving; h, hour; wk, week; y, year.

**Table 5. Quality of evidence appraised using the Newcastle-Ottawa Scale for cohort studies**

	Selection (score=0-3) †			Comparability (score=0-2)		Outcome (score=0-3)			Total
	CG cohort is representative	Non-CG cohort is comparable	Measuring CG	Dealing with the endogeneity of CG‡	Control variables	Assessment of outcome	Length of follow-up	Lost to follow-up	
Leigh 2010	1	1	1	0	1	1	1	1	7
Nguyen 2014	1	1	1	1	1	1	0	NA	6
Watts 2008	1	1	1	1	1	1	0	NA	6
Jacobs 2014	1	1	1	0	1	1	0	NA	5
Lilly 2010	1	1	1	0	1	1	0	NA	5
Proulx 2014	1	1	1	0	1	1	1	1	7
Chai 2021	1	1	1	1	1	1	0	NA	6
Wang 2018	1	1	1	1	1	1	0	NA	6
Bolin 2008	1	1	1	1	1	1	1	1	8
Ciccarelli 2018	1	1	1	1	1	1	1	1	8
Kolodziej 2018	1	1	1	1	1	1	1	1	8
Floridi 2020	1	1	1	0	1	1	1	1	7
Heger 2020	1	1	1	1	1	1	1	1	8
Raab 2017	1	1	1	1	1	1	1	1	8
Hoheyer 2018	1	1	1	0	1	1	1	1	7
Meng 2011	1	1	1	1	1	1	1	1	8
Meng 2013	1	1	1	1	1	1	1	1	8
Magnani 2009	1	1	1	1	1	1	1	1	8
Kitamura 2020	1	1	1	1	1	1	1	1	8
Yamada 2015	1	1	1	1	1	1	0	NA	6
Do 2008	1	1	1	1	1	1	1	1	8
Vangen 2020	1	1	1	0	1	1	1	1	7
Carmichael 2010	1	1	1	0	1	1	1	1	7
Carr 2016	1	1	1	0	1	1	1	1	7
Drinkwater 2015	1	1	1	0	1	1	0	NA	5

	Selection (score=0-3) †			Comparability (score=0-2)		Outcome (score=0-3)			Total
	CG cohort is representative	Non-CG cohort is comparable	Measuring CG	Dealing with the endogeneity of CG‡	Control variables	Assessment of outcome	Length of follow-up	Lost to follow-up	
King 2013	1	1	1	0	1	1	1	1	7
Gomez-Leon 2017	1	1	1	0	1	1	1	1	7
Coe 2011	1	1	1	1	1	1	1	1	8
Lee & Tang 2015	1	1	1	0	1	1	0	NA	5
Lee 2015	1	1	1	0	1	1	1	1	7
Van Houtven 2013	1	1	1	1	1	1	1	1	8

† We have excluded one item under “selection” that assessed if studies included individuals who presented with the outcome of interest at the beginning of the study.

‡ We modified this item to assess if studies utilized any techniques to mitigate the potential endogeneity of caregiving in their analysis.

**Abbreviations:** CG, caregiving.

The original assessment items can be found via [http://www.ohri.ca/programs/clinical\\_epidemiology/nosgen.pdf](http://www.ohri.ca/programs/clinical_epidemiology/nosgen.pdf)

## Figures

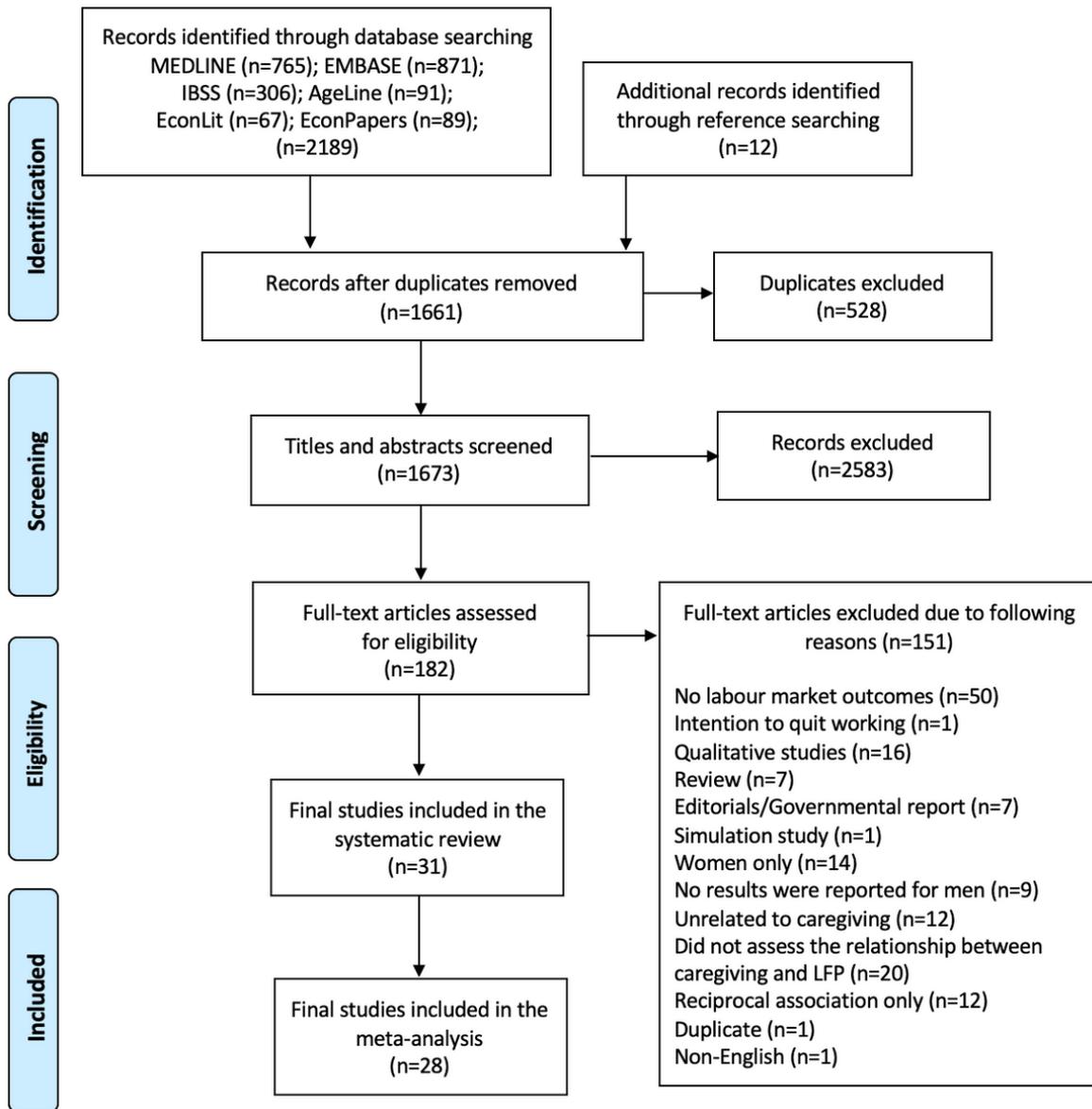


Figure 1

A PRISMA diagram documenting study inclusion. Literature search was conducted in February 2021. IBSS, International Bibliography of the Social Science; LFP, labour force participation.

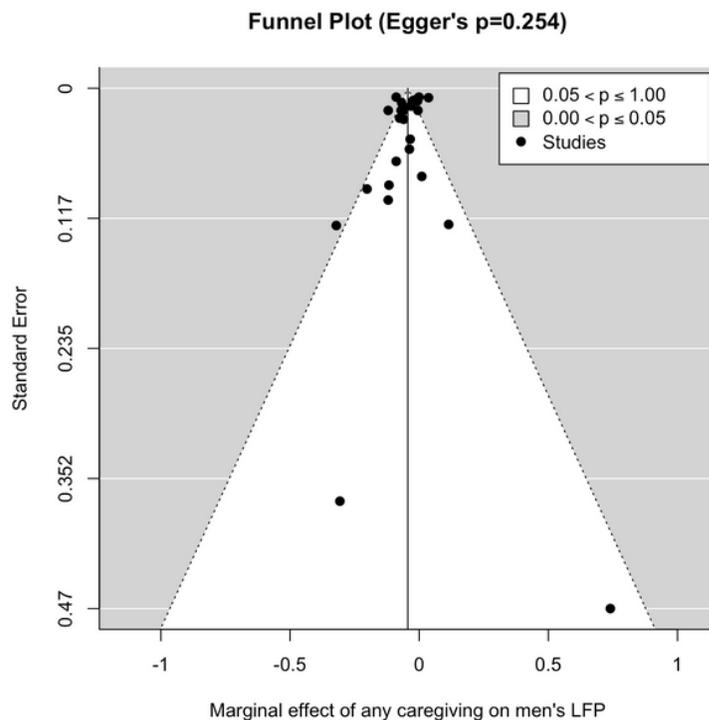
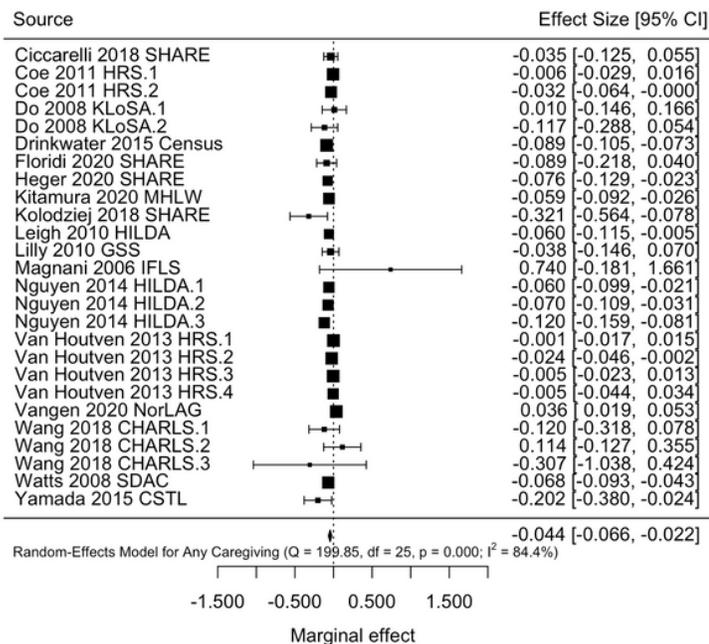


Figure 2

A forest plot showing the marginal effect of any caregiving on men's labour force participation (left) and a funnel plot assessing the publication bias (right)

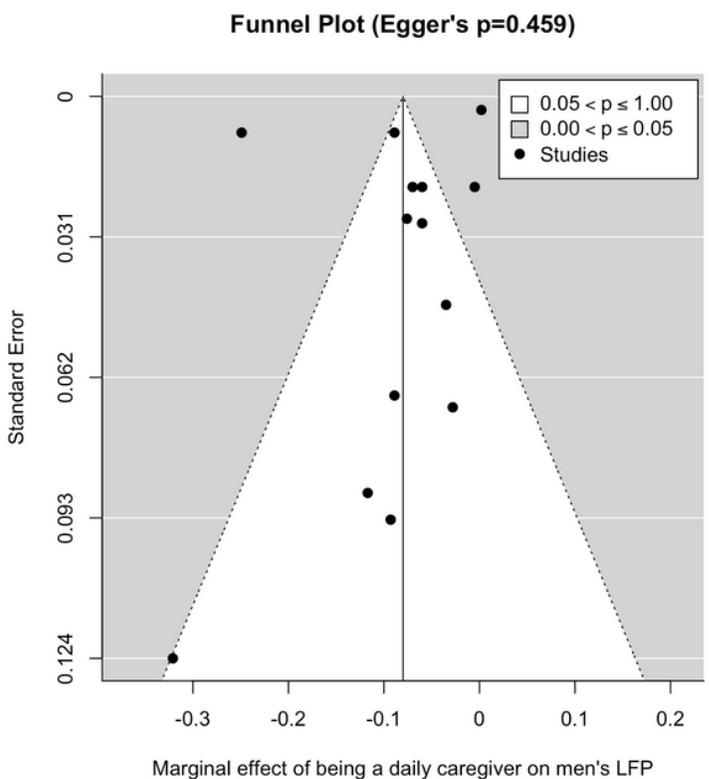
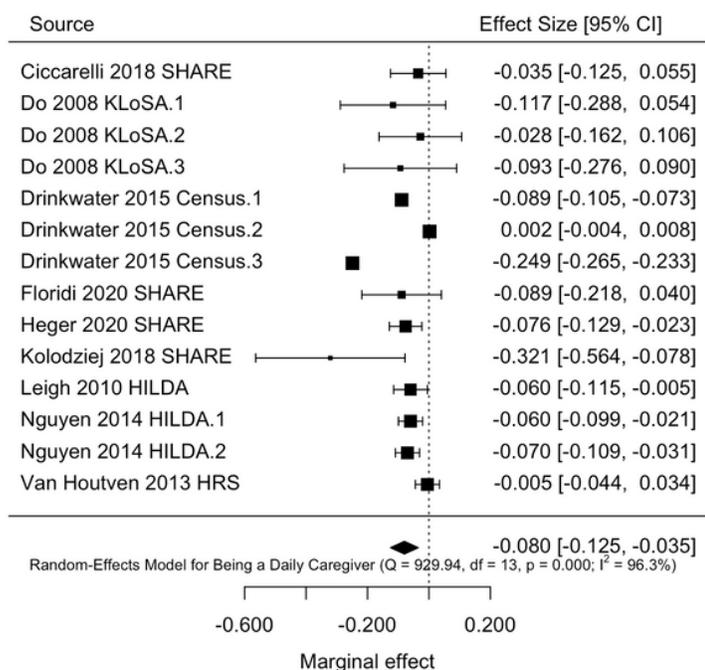
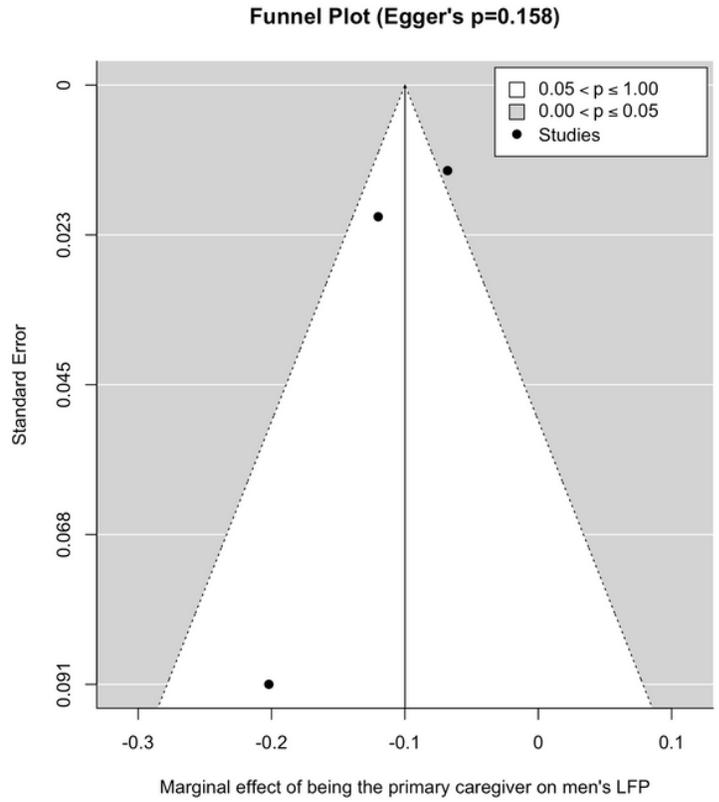
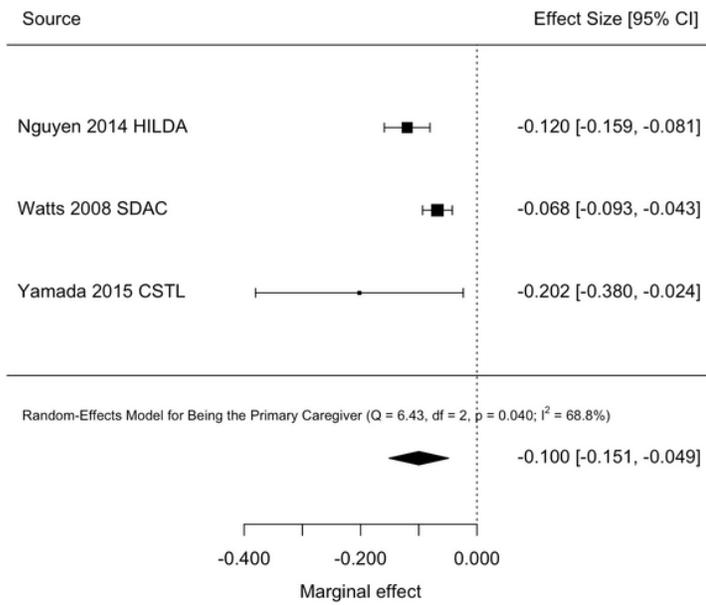


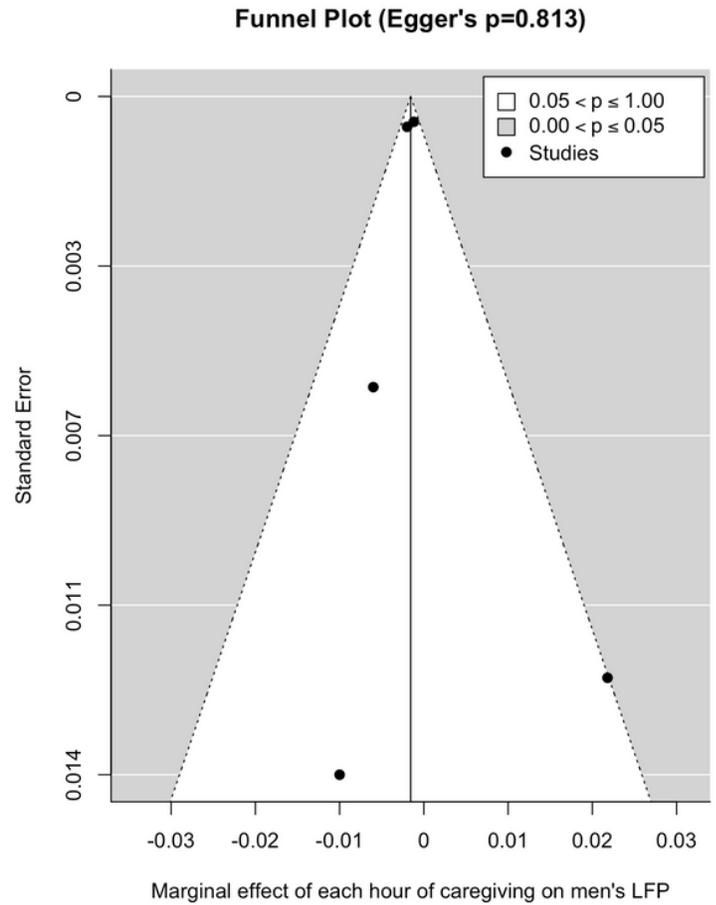
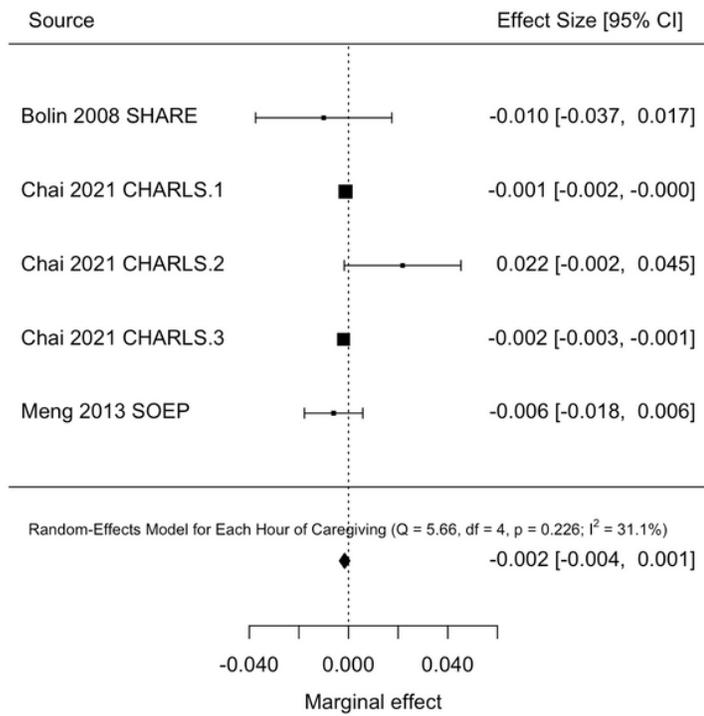
Figure 3

A forest plot showing the marginal effect of daily caregiving on men's labour force participation (left) and a funnel plot assessing the publication bias (right)



**Figure 4**

A forest plot showing the marginal effect of primary caregiving on men's labour force participation (left) and a funnel plot assessing the publication bias (right)



**Figure 5**

A forest plot showing the marginal effect of an hourly increase of caregiving on men's labour force participation (left) and a funnel plot assessing the publication bias (right)