MEMOIRE

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Effects of the birth of the first child in households with and without paternity leave in Belgium

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Abstract

The purpose of this study was to examine the effect of paternity leave on men's and women's time use. The paternity leave being a short leave of 10 days, this study examined the effect of having paternity leave compared to no paternity leave at all. The results showed that men who took paternity leave spent more time for childcare. There was a weak negative effect on men's work and men also have more time for entertainment if they benefited from paternity leave. We also find that women sleep more if they partner benefited from the policy. Looking at fertility, we found that families where the dad had access to paternity leave took more time to get another child.

1 Context and motivation

On August 10 2001, Belgium has introduced a new law that allowed fathers to take up to 10 days off in the 4 months following the birth of their child. This law was applicable starting from the 1st of July 2002, meaning that fathers of children born after that date could benefit from the paternity leave while others could not. The goal of this kind of policy is most of the time to reduce inequalities between the mother and the father whether it is in their career (wage, position,...) or in the household (childcare, housework,...). (Sevilla-Sanz, 2011; Fuwa, 2004) The birth of the first child is an additional cause of inequality between men and women with the addition of childcare to housework. (Chizuko, 2005) The goal of this study is to see how the introduction of paternity leaves affected the time use of heterosexual couples but also the effect on fertility. Some research findings imply a positive effect of parental leave (without focusing on paternity leave) on fertility (Rafael, 2009) and others imply a negative effect of paternity leave on fertility. (Farré, 2019) Our data describes the Time use of our studied households in 2013, we are looking at their behaviour long after they benefited or not from the paternity leave. The goal is to look at the long-term behavioural differences between the two populations.

2 Dataset description

For this study we used data from the "Belgian 2013 Time-Use Survey" and the "2013 Labour force survey" that was conducted together. The data is delivered by the Belgian statistical office, Statbel. The data contained variables about households such as the region, size of the household, data at the individual level for each member and data on time use with the time for each activity and time-slot. The dataset for 2013 contains data for 2098 households. The activity dataset contains 129.317 activities for the members of the household split by activity type and duration. We had 396 different activities that we regrouped into 24 broader categories. After filtering for households with heterosexual parents and at least one child, we ended up with 377 data points. Each member above 10 years old was given a diary that they had to fill for one weekday and one weekend day, each member had to choose the same day.

3 Exploratory Analysis

This section will be an overview of the dataset after we filtered it down to the data points we need. We will look at the time for each activity for men and women for different categories such as education levels, regions.
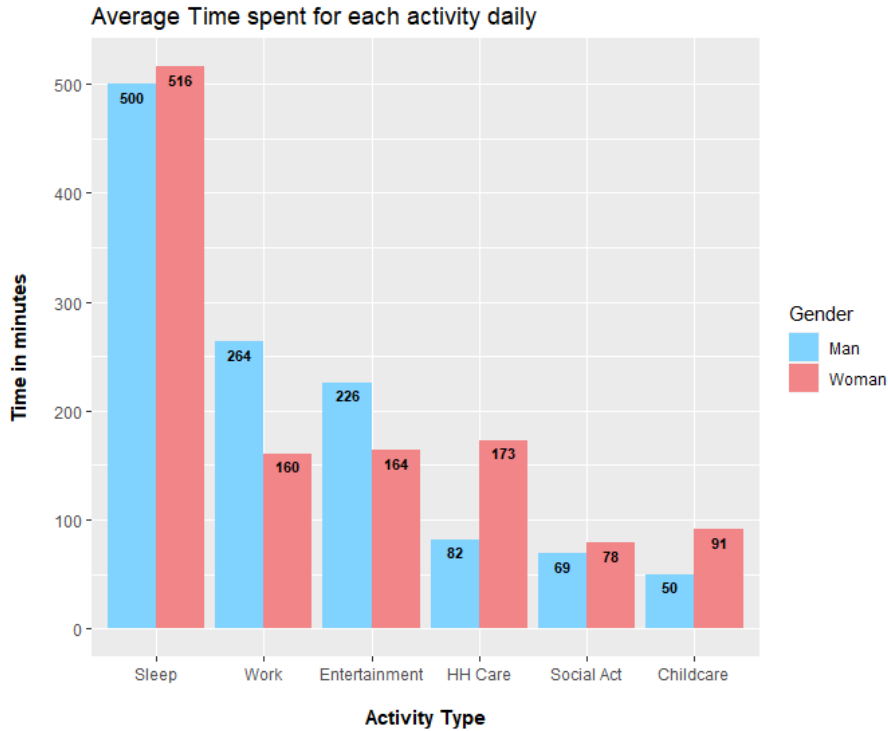

Figure 1: Average Time Spent for Each Activity

We see that Childcare and Household Care (which contains household tasks other than the ones linked to children) are still mainly done by the woman in 2013. Men work more on average, but they also have more time for

entertainment. Sleep and social activities are not significantly different. Those are the kinds of differences the policy aims to reduce. We will see later in section 5 (Results and Discussion) the results obtained in the literature, our results and also which mechanisms are or could be the explanation for those effects.

Work average may seem too low as it is only 264 minutes (4h24 minutes daily) of work for men but keep in mind that one of the two days of survey was a weekend day, so it is on average 8h48 of work for men which makes sense in Belgium.

3.1   Region

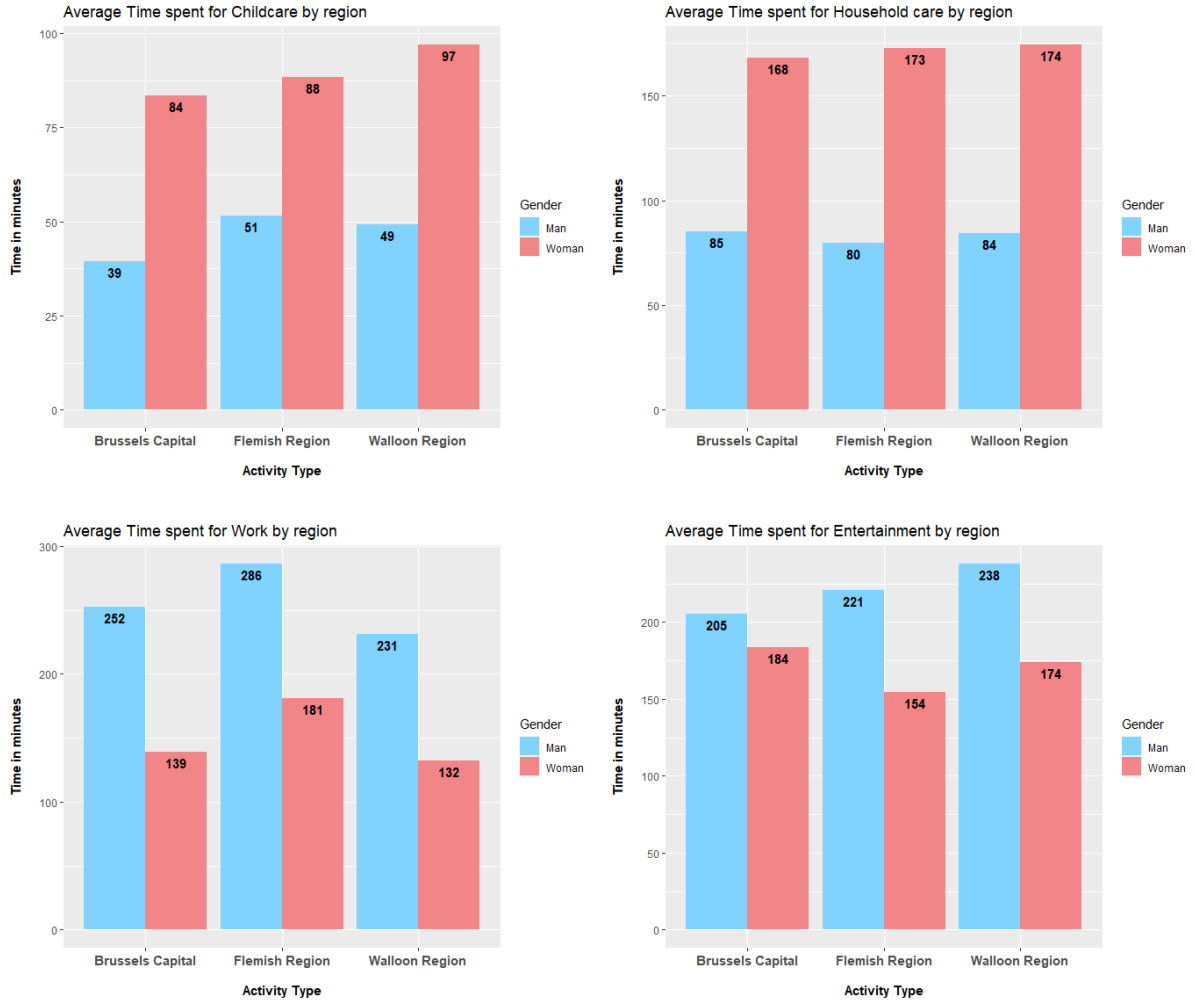Figure 2: Differences between Men and Women by Region

We see that there are no clear differences between regions in the way the household works, the woman always has more time spent for childcare and household care, always less work and entertainment time. The Walloon region has more total childcare and entertainment and less total work. This is probably due to the Walloon region having more unemployment (Cockx, 2013)

3.2 Education level

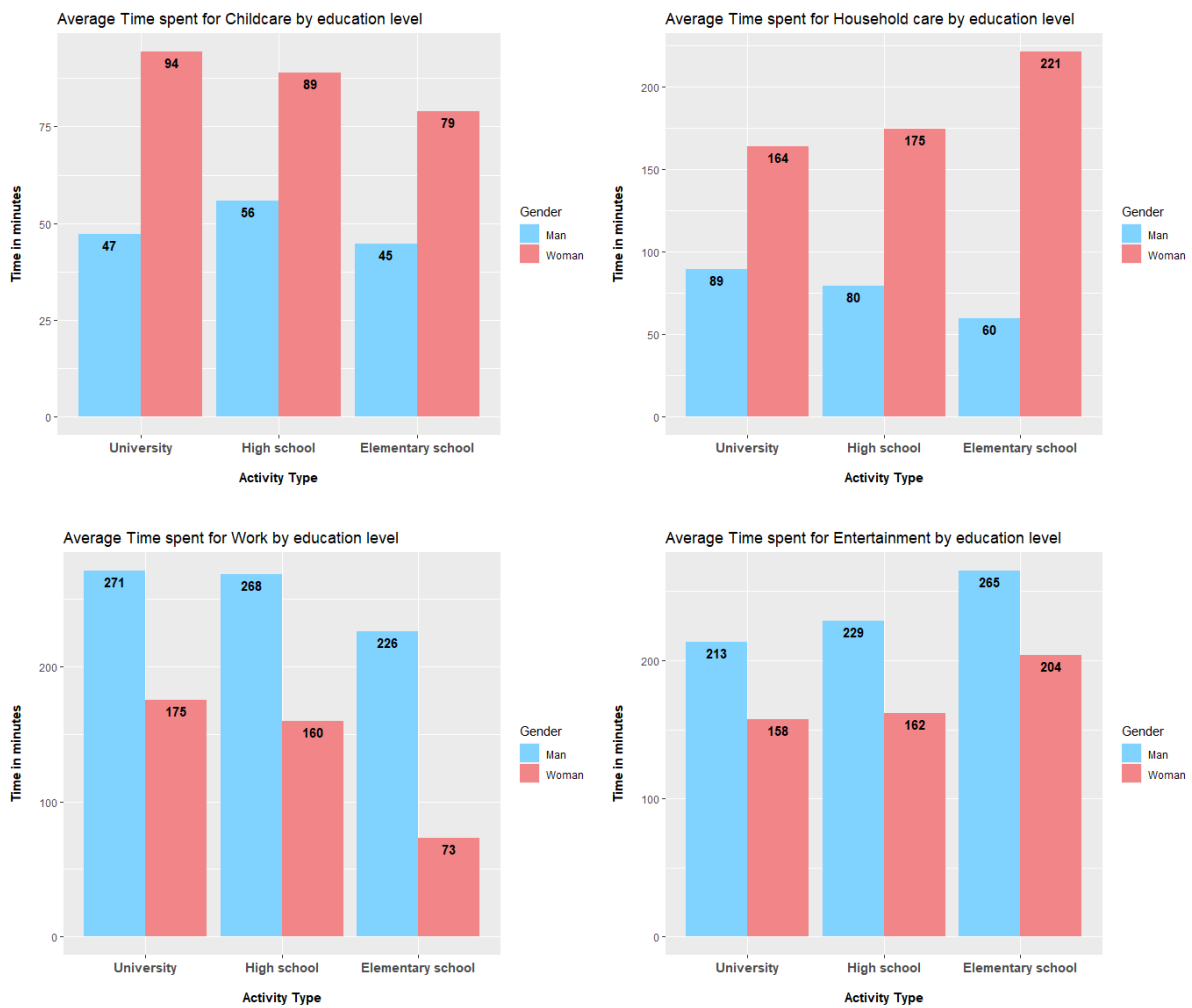Figure 3: Differences between Men and Women by Education Level

The time spent for childcare seems to increase with education levels for women, for men it seems as if there is no relationship. For other household tasks, it seems that less educated women work more while less educated men seem to do less. The relation of work is obvious and linked to unemployment rates and entertainment probably has the same explanation.
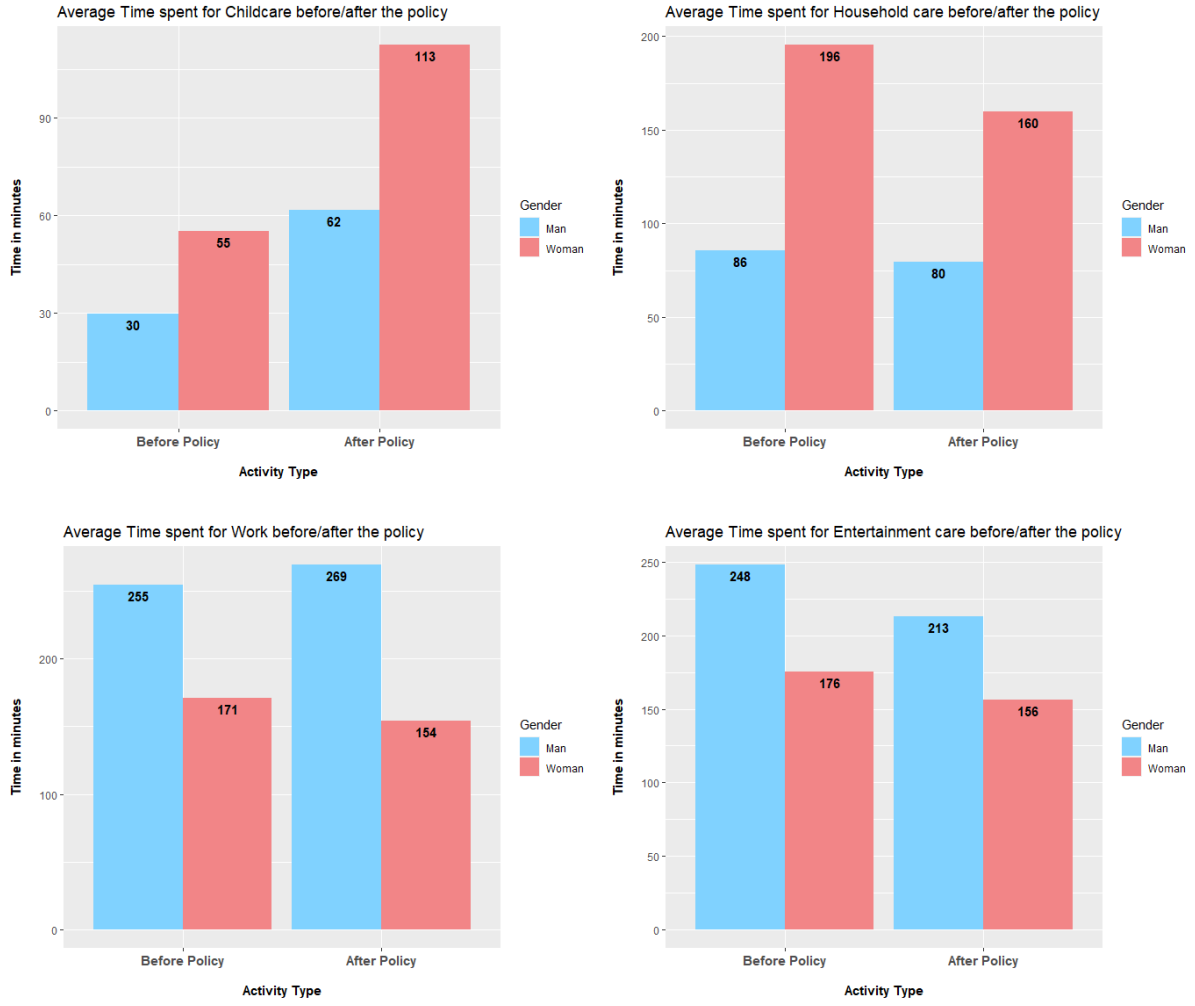
3.3 Eligibility for paternity leave

Figure 4: Differences between Men and Women by Eligibility Categories

We will run a regression discontinuity design later but we can already look at the differences in averages between groups that could have benefited from the paternity leave and the ones who could not. Those results are not reliable as the running variable that is used to compute the eligibility variable is the birth date of the first child. It means that the eligible group in 2013, has younger children and the differences are mainly due to that.

4   Method

We used a regression discontinuity design in order to compare households and members that had their first child near the 1st of July 2002. By comparing the time use and other variables of the households near the threshold, we essentially compare the same population with the only difference being their eligibility for the paternity leave. We have a fuzzy regression discontinuity design as the fathers were not forced to take the days off as soon as they were eligible. The regression is constructed as follows:

$$Y = a + b * T + c * D + d * X + e$$

Y: The outcome variable

- Household income
- Working time
- Time for housework
- Time between first and second child
- Time to take care of the child

- Time for social activities
- Time to rest

T: 1 if the first child is born after July 1, 2002, 0 otherwise

D: normalised date of birth of the first child (July 1, 2002 = 0)

X: Control variables
- Household income
- Socio-professional status of the reference member of the household
- Level of education
- Nationality
- Number of children
- Household size

We used bandwidth selection tool, the plot and the regression function from the RD robust package for R (Calonico, 2017)

4.1 Assumptions

There are two assumptions to validate.

The continuity assumption: the continuous variables other than the outcome variable are continuous at the cutoff. In our case the only continuous control variable that we use is the household size and it is continuous at the cutoff because the eligibility variable is not significant.

Table 1: Effect of Eligibility on Household size

	NrHH
Eligible	-0.054
	(0.142)
Running_birth-date	-0.0002^{***}
	(0.00005)
Constant	4.421^{***}
	(0.076)
N	377
R-squared	0.144
Adj. R-squared	0.139
Residual Std. Error	0.845 (df = 374)
F Statistic	31.429^{***} (df = 2; 374)

Sorting Assumption: There should be no sorting at the cutoff, the households should not be able to change the running variable's value to be in one of the two categories. Here it should be impossible by design, as the households were not aware of the policy in advance enough to decide to have a child before or after. We ran the McCrary sorting test (McCrary, 2008) and ended up with a p-value of 0.7235 meaning we cannot reject the null hypothesis of no sorting (confirming our assumption).
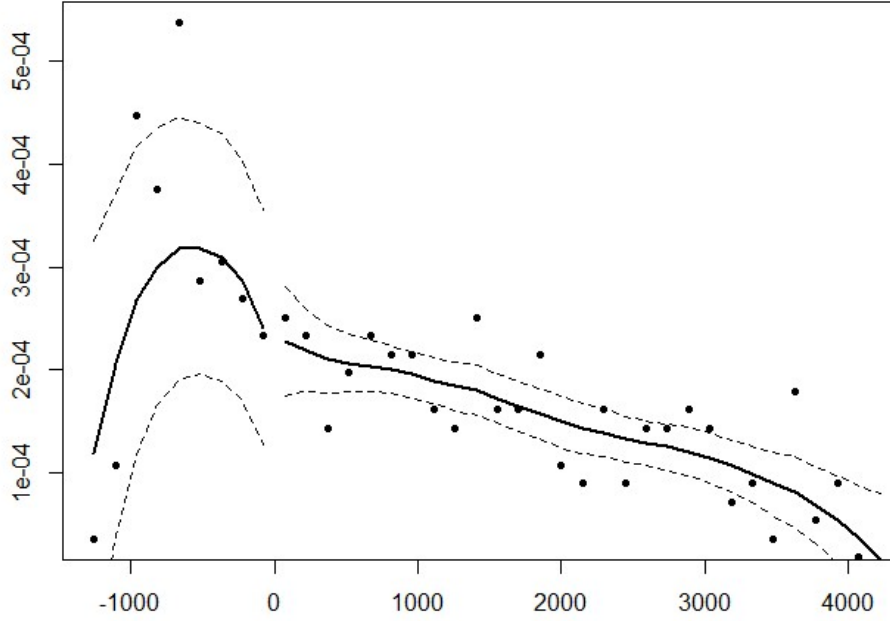
Figure 5: McCrary Sorting Test

5 Results and discussion

5.1 Household analysis

We first aggregated the data at the household level, this means we look at the total time spent doing each activity. We compare the behaviours at the household level first before looking at each parent individually.

5.1.1 Childcare

The effect of paternity leave on childcare is expected to be positive, we already have results in the literature that showed a positive relationship between paternity leave and involvement in childcare (Meil, 2013; González, 2021; Haas, 2008) Not only that but it appears that the longer the leave, the greater the effect (Meil, 2021) and the effect is also significant in the long-term (Nepomnyaschy, 2007) We expect the effect of paternity leave to reduce the share of care the woman provides (Tamm, 2018) So the total effect for the heterosexual households should be positive and our results are consistent with the literature. We observe a difference of 2.138 percentage points which accounts for around 30 minutes per day (Appendix: Fig 6). We will look later into the effect for each parent.

5.1.2 Work

We do not expect any relation between paternity leave and work for the household as a whole, it is more interesting to look at each parent individually as the total effect can be null but we may have a shift. From our results we see that the households that could have benefited from the policy work less but the results are not significant and we cannot conclude anything.

5.1.3 Time between children and Fertility

According to the literature, the effect on fertility is either negative or there is no effect. Farré and González (Farré, 2017; Farré, 2019) came to the conclusion that it reduces fertility among older women and delays in births. According to them, his effect may be a consequence of an increase of men's involvement in childcare which is consistent with our findings but also a consequence of an increase in women's attachment to labour. However many other do not find any effect on fertility (Hart, 2019; Cools, 2015; Hart, 2022) We first looked at the effect on time between children. We used a subset of households that had a second child and counted twins as one child. We got a highly significant negative effect of paternity leave on time between child. We see that households in which the parent benefited from paternity leave wait on average 468 days more before having another child (Appendix: Fig 7).

5.1.4 Household and family care

We also looked at the effect on household care and family care (childcare not included). It is again a variable that we will analyse for each member but the total effect can be interesting too. We have no significant effect here.

5.2 Parent analysis

5.2.1 Men & Women Childcare

We expect the effect to be positive as we have already discussed and we indeed find highly significant positive results. We see on average an increase of 31 minutes per day (Appendix: Fig 8). This is consistent with the literature and with the objective of such policy. On the other side, we find no effect on women's childcare. This explains the net increase in our household analysis and means that the man is not replacing the woman in any way but just brings support.

5.2.2 Men & Women Work

The effect on work in the long term is expected to be positive for women according to some. Women see an increase in their labour participation by reducing the penalty on pay as it becomes more acceptable to take parental leaves in general or because the woman decreases her leave duration (Van Belle, 2016) They also see their re-employment probability increase. (Farré, 2017) For men we do not expect any effect on labour outcomes (Cools, 2015; Farré, 2019) Also in our case the paternity leave is up to 10 days maximum which will obviously not have the same consequences as the mothers who usually take longer periods off. In our analysis we find a weakly significant negative effect on men's work, which work on average 50 minutes less per day if they benefited from the paternity leave (Appendix: Fig 9). This can be due to the raised awareness for the men who will trade work time for childcare. For women we do not find any significant result and it is again probably due to the fact that 10 days of paternity leave will not affect long-term maternity leave of the woman and thus will not reduce their penalty on pay.

5.2.3 Men & Women Household and family care

We already had a look at the effect on childcare but this variable is every household and family task that is not linked to the child. It is useful to see if the parent see a shift in childcare and household separately to get more insights. For the men we find no significant effect meaning that men benefiting from the paternity will help the household mainly through childcare as we have seen earlier. Keep in mind that it is the long-term effect on time use that we are looking at. It would make a lot of sense that during his days off the dad will focus on spending time with his child. But apparently this is also the case in the long term. We find no significant effect for women either, which as we have seen in the childcare section that the woman is not doing less work in households where the dad benefited from paternity leave (Appendix: Fig 10). This most likely means that they trade their time for something else.

5.2.4 Men & Women Entertainment

Looking at the group in which the father may have benefited from the paternity leave, we see less time dedicated to entertainment for both men and women, though it is only significant for the dad (Appendix: Fig 11). This is consistent with the results from Farré (Farré, 2019) that also saw that the dad traded leisure time for childcare. In his case leisure included sleep while we analyse it separately. We also see that women do not use the additional support from the dad for their personal activities. Women also reduced their social activity time, we found significant results of a negative relation between the fact that the dad benefited from paternity leave and social activities of women (Appendix: Fig 12). This is a surprising result but that may be due to a shift in how women see the family sphere and maybe put less emphasis on external relationships to focus on the family. This may need more attention as the literature does not really cover this effect of paternity leave policies.

5.2.5 Men & Women Sleep

Another leisure category, for men we do not have any significant result while we observe that women sleep on average 1h15 per day more than women whose partner did not benefit from the paternity leave (Appendix: Fig 13). This means that women use the support from their partner to get more rest which can make sense as the arrival of the first child is highly likely to drain the rest time. Which is a positive effect of the policy against inequalities.

6 Implications/Applications

Our results are most of the time confirming the already existing literature, reinforcing the previous research in this area. But it also brings nuance on which effects a short paternity leave can have compared to a longer one

that we may see in other research papers. The effect on men's childcare and household care is the main effect that interested us as a way to reduce inequalities. We found that really short paternity leaves have an effect only on childcare and not household care. This shows that for the dad to be more involved in every aspect of household care, we would need longer paternity leaves as we see in the literature. A short paternity leave may have an effect through raising awareness more than through changing habits. As we have said earlier, it would make sense for the dad to focus on spending his short leave with his child and that can lead to a shift of childcare only. We do also not see the same effect on work again the short duration is most likely the cause because 10 days of paternity leave is not enough to change the woman's situation but the dad seem to shift some work time to activities for the household. We also see that paternity leaves can affect the family in other ways as women can benefit from more sleep and choose to reduce social activities and the household takes more time to have another child probably to focus on the first one and because of increased awareness on the dad side.

The implications are clear short paternity leaves can be used to raise awareness for the dad but are not enough to tackle the bigger challenges such as reducing women's burden that are household tasks other than childcare. And certainly not enough to shift the working times and as a consequence reducing the salary gap and other effects on careers.

However, it can at the really low cost of 10 days only as a starting point, raise awareness for the man and bring some optimistic results. But stopping there would be a mistake if we aim to have more equal households.

Acknowledgements

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7   Appendix

Household childcare
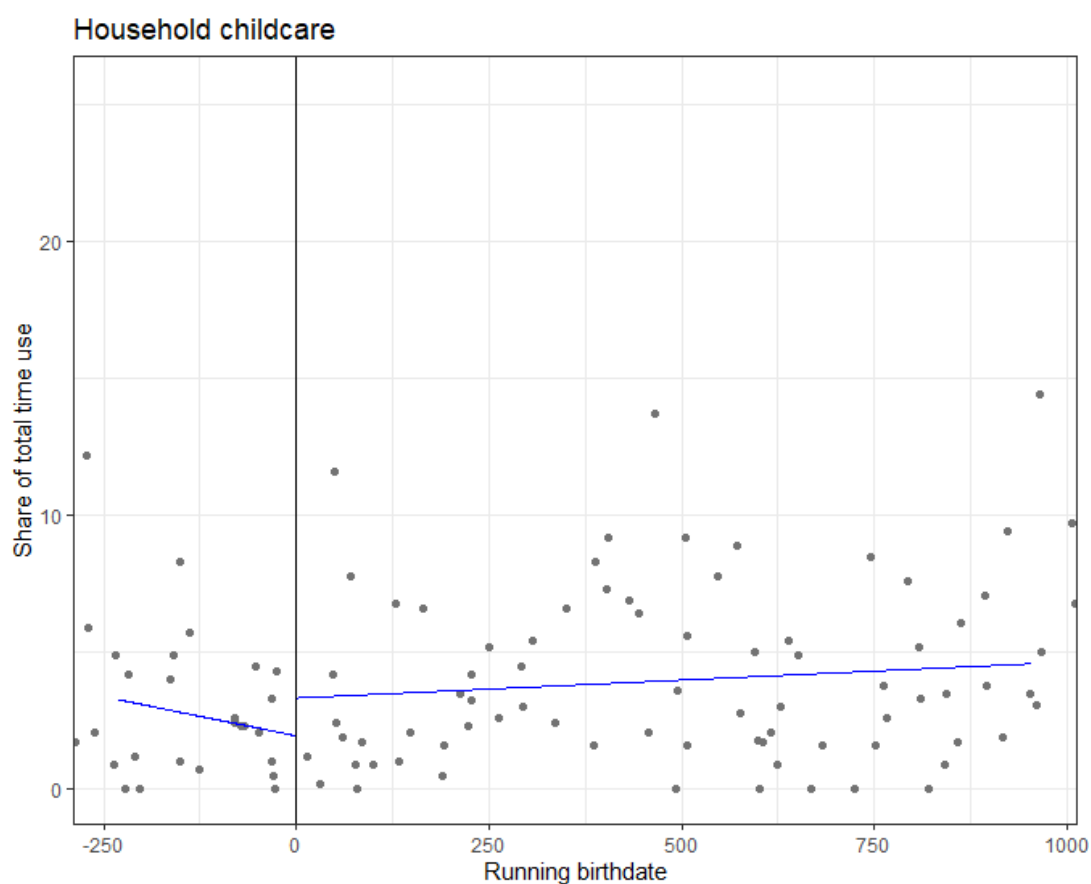
(a) RDD Plot


```
Number of Obs.                    377
BW type                        certwo
Kernel                     Triangular
VCE method                         NN

Number of Obs.                    145              232
Eff. Number of Obs.                21               77
Order est. (p)                      1                1
Order bias  (q)                     2                2
BW est. (h)                   229.584          953.915
BW bias (b)                   581.235         1991.282
rho (h/b)                       0.395            0.479
Unique Obs.                       136              225

==================================================================
       Method    Coef. Std. Err.        z    P>|z|    [ 95% C.I. ]
==================================================================
 Conventional    2.138      0.860    2.487    0.013  [0.453 , 3.823]
Bias-Corrected   2.310      0.860    2.687    0.007  [0.625 , 3.995]
       Robust    2.310      0.950    2.431    0.015  [0.448 , 4.172]
==================================================================
```

(b) RDD summary

Figure 6: Effect on childcare for households
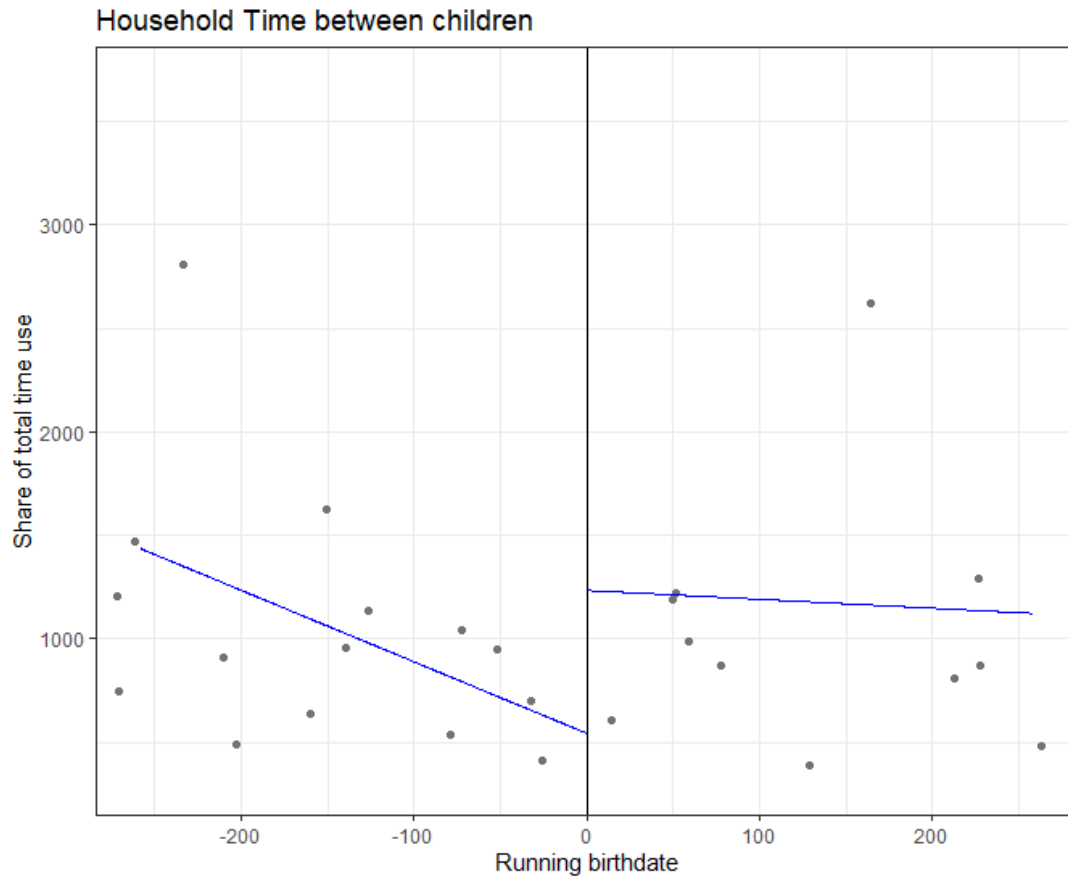
(a) RDD Plot

```
Number of Obs.              212
BW type                    cerrd
Kernel                Triangular
VCE method                   NN

Number of Obs.               83          129
Eff. Number of Obs.          12           10
Order est. (p)                1            1
Order bias  (q)               2            2
BW est. (h)             258.068      258.068
BW bias (b)             589.694      589.694
rho (h/b)                 0.438        0.438
Unique Obs.                  82          128

=================================================================================
       Method     Coef. Std. Err.         z     P>|z|       [ 95% C.I. ]
=================================================================================
  Conventional  467.833   263.923     1.773     0.076   [-49.447 ,  985.113]
Bias-Corrected  524.313   263.923     1.987     0.047    [7.033 , 1041.593]
        Robust  524.313   313.757     1.671     0.095   [-90.639 , 1139.265]
=================================================================================
```

(b) RDD summary

Figure 7: Effect on fertility for households

Men's Childcare
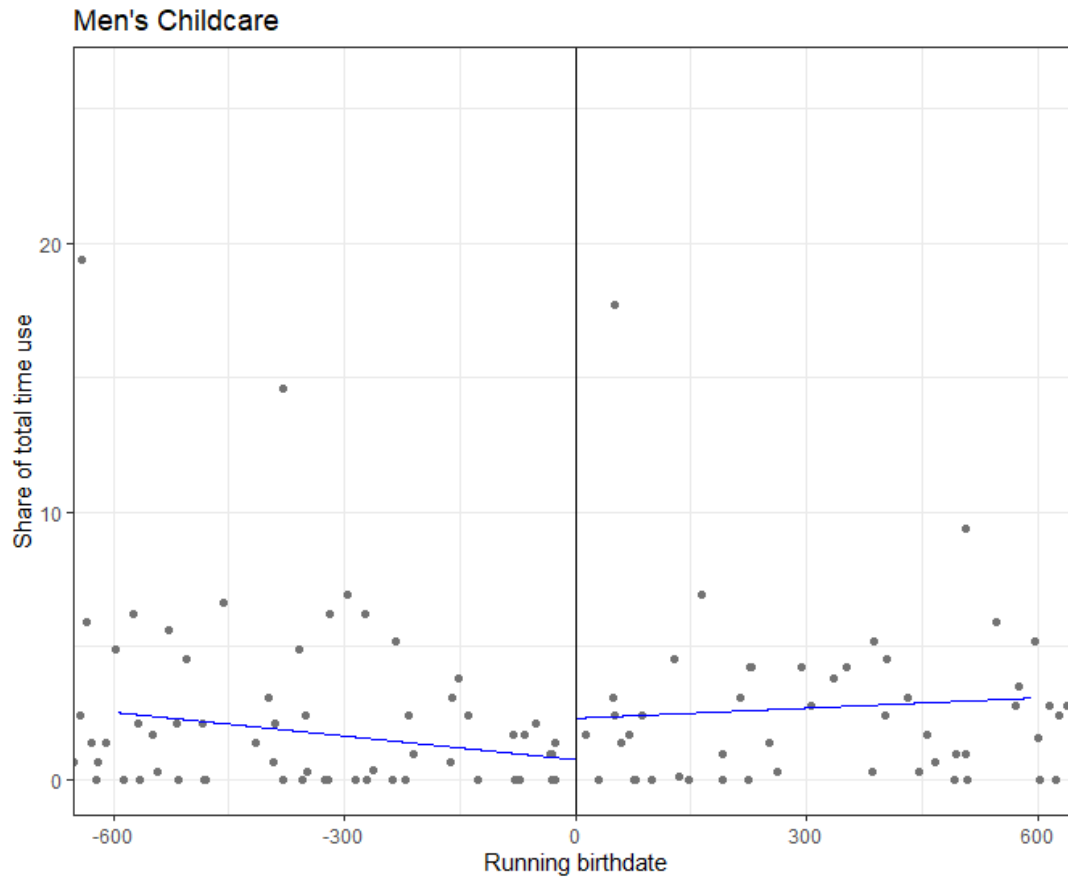
(a) RDD Plot

```
Number of Obs.                    353
BW type                        msetwo
Kernel                     Triangular
VCE method                         NN

Number of Obs.                    132              221
Eff. Number of Obs.                39               89
Order est.  (p)                     1                1
Order bias  (q)                     2                2
BW est.  (h)                  411.841         1183.857
BW bias  (b)                  709.744         1843.969
rho (h/b)                       0.580            0.642
Unique Obs.                       124              215

========================================================================
        Method     Coef. Std. Err.        z     P>|z|      [ 95% C.I. ]
========================================================================
  Conventional     2.300     0.966     2.381     0.017   [0.407 , 4.193]
Bias-Corrected     2.706     0.966     2.802     0.005   [0.813 , 4.599]
       Robust      2.706     1.183     2.287     0.022   [0.387 , 5.025]
========================================================================
```

(b) RDD summary

Figure 8: Effect on childcare for men

13
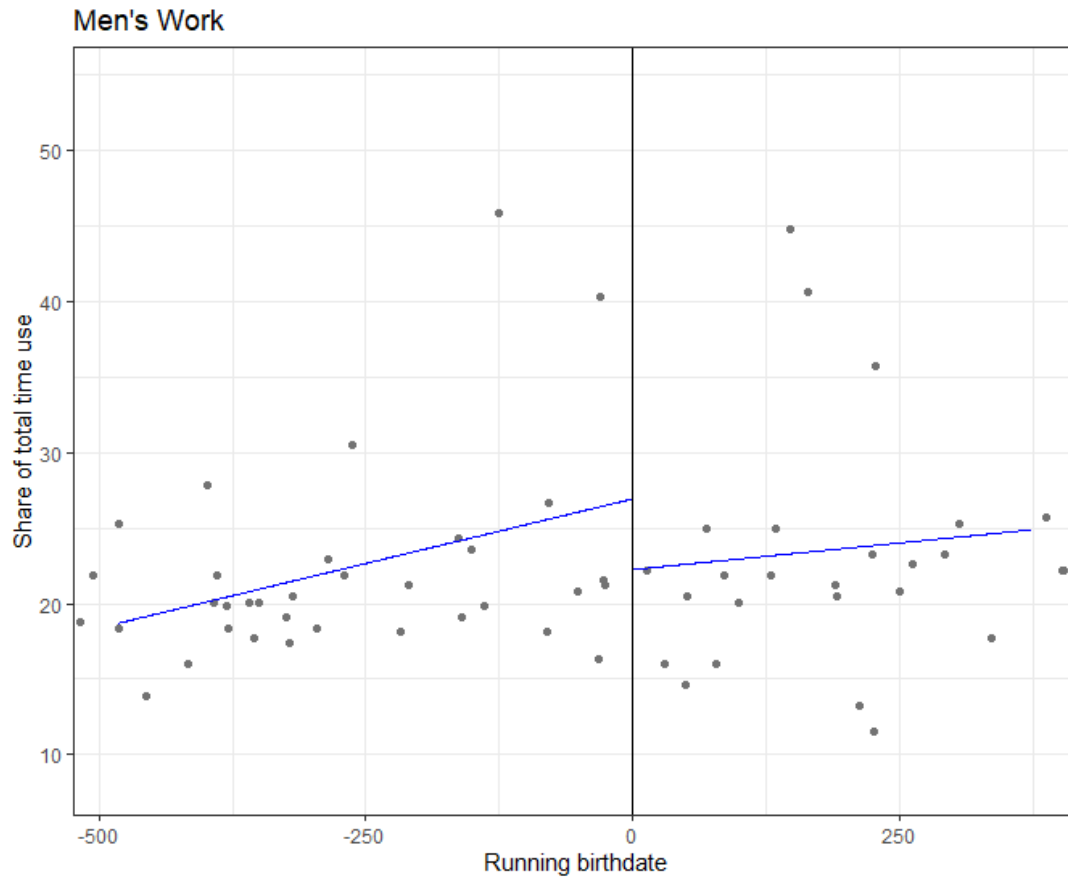
(a) RDD Plot

```
Number of Obs.                    279
BW type                        Manual
Kernel                     Triangular
VCE method                         NN

Number of Obs.               101         178
Eff. Number of Obs.           32          25
Order est.  (p)                1           1
Order bias  (q)                2           2
BW est.  (h)             480.956     373.956
BW bias (b)              480.956     373.956
rho (h/b)                  1.000       1.000
Unique Obs.                  101         178

=================================================================
     Method     Coef. Std. Err.        z     P>|z|     [ 95% C.I. ]
=================================================================
  Conventional  -6.260     3.656   -1.712     0.087  [-13.426 , 0.906]
Bias-Corrected  -8.973     3.656   -2.454     0.014  [-16.139 , -1.807]
       Robust   -8.973     5.261   -1.706     0.088  [-19.284 , 1.338]
=================================================================
```

(b) RDD summary

Figure 9: Effect on work for men

Women's Household care
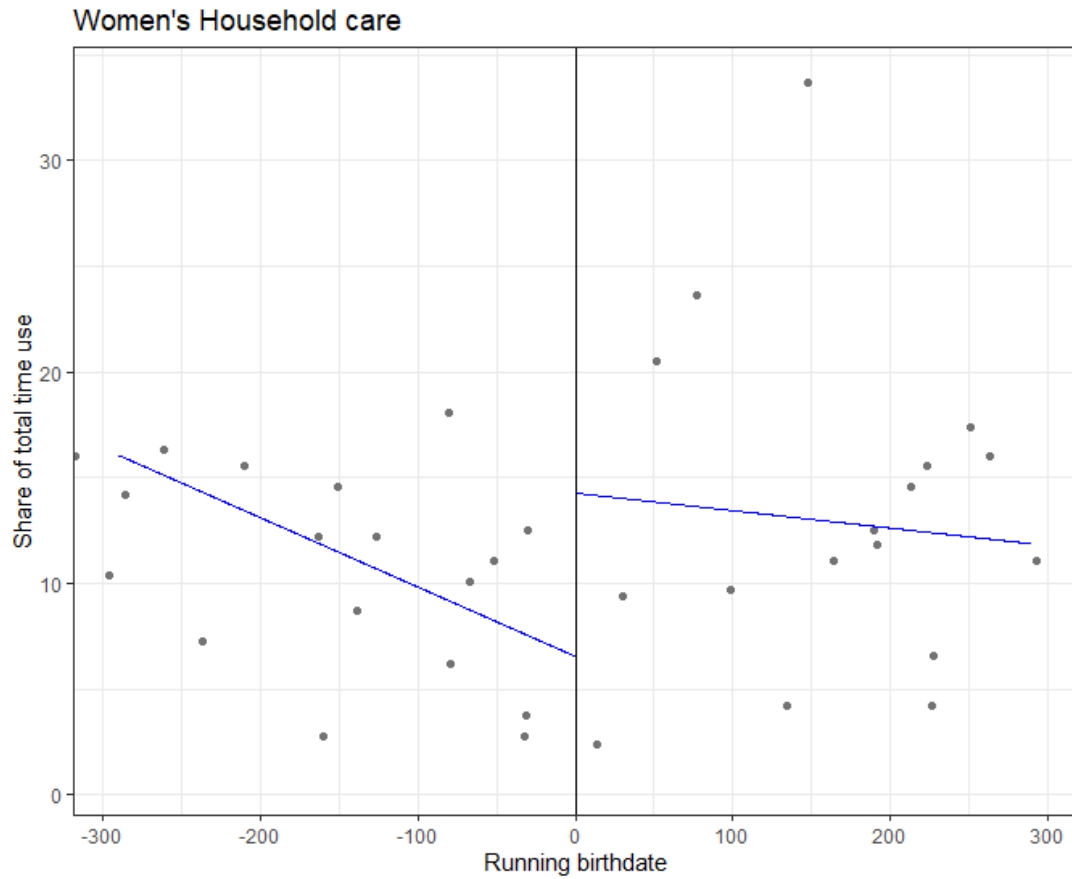
(a) RDD Plot

```
Number of Obs.                   217
BW type                       msesum
Kernel                       Uniform
VCE method                        NN

Number of Obs.                    83              134
Eff. Number of Obs.               17               17
Order est.  (p)                    1                1
Order bias  (q)                    2                2
BW est.  (h)                 289.819          289.819
BW bias  (b)                 612.094          612.094
rho (h/b)                      0.473            0.473
Unique Obs.                       77              132

=================================================================================
        Method    Coef. Std. Err.        z     P>|z|      [ 95% C.I. ]
=================================================================================
  Conventional    7.724      3.614    2.137     0.033   [0.641 , 14.808]
Bias-Corrected    8.723      3.614    2.414     0.016   [1.640 , 15.807]
        Robust    8.723      4.196    2.079     0.038   [0.499 , 16.947]
=================================================================================
```

(b) RDD summary

Figure 10: Effect on household care for women

15

Men's Entertainment
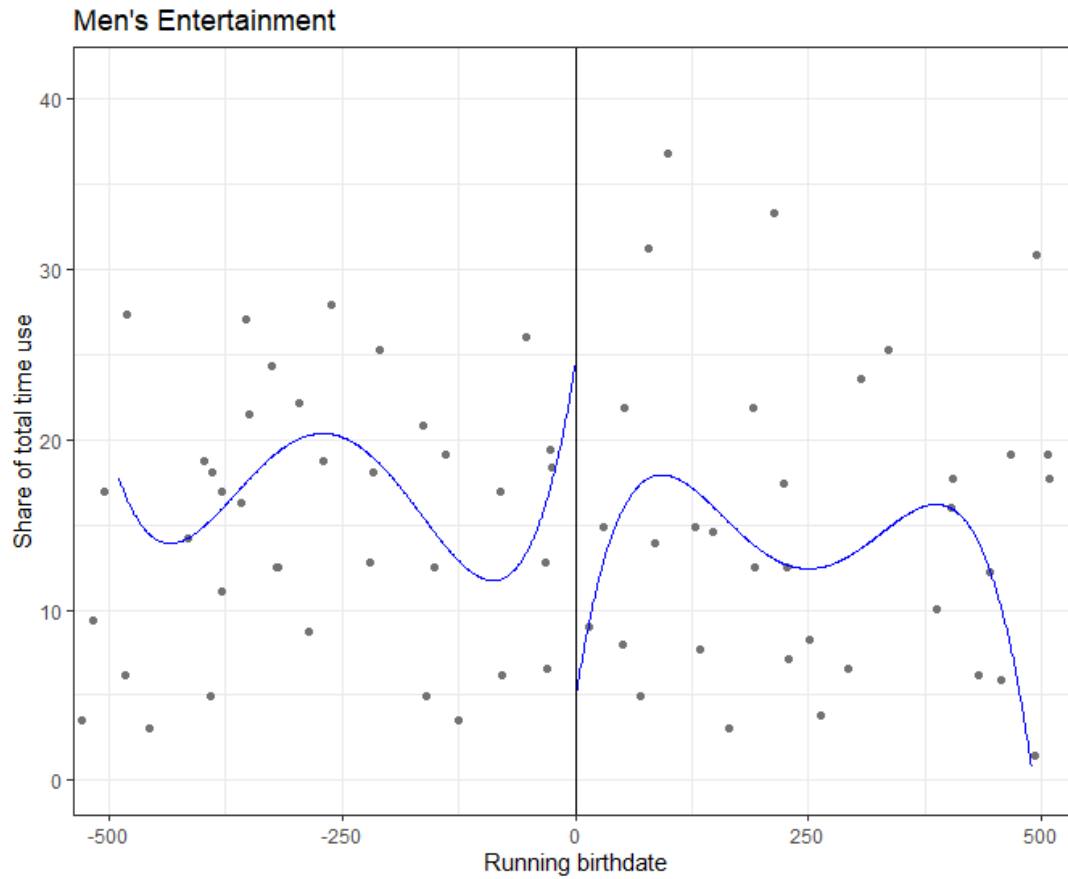
(a) RDD Plot

```
Number of Obs.                      279
BW type                           mserd
Kernel                      Epanechnikov
VCE method                           NN

Number of Obs.                      101                 178
Eff. Number of Obs.                  32                  31
Order est. (p)                        4                   4
Order bias  (q)                       5                   5
BW est. (h)                     477.102             477.102
BW bias (b)                     639.443             639.443
rho (h/b)                         0.746               0.746
Unique Obs.                          99                 174

===============================================================================
        Method      Coef. Std. Err.         z     P>|z|      [ 95% C.I. ]
===============================================================================
   Conventional    -20.819     11.532    -1.805     0.071  [-43.421 , 1.783]
 Bias-Corrected    -23.728     11.532    -2.058     0.040  [-46.330 , -1.126]
         Robust    -23.728     12.945    -1.833     0.067  [-49.099 , 1.643]
===============================================================================
```

(b) RDD summary

Figure 11: Effect on entertainment for men

Women's Social activity
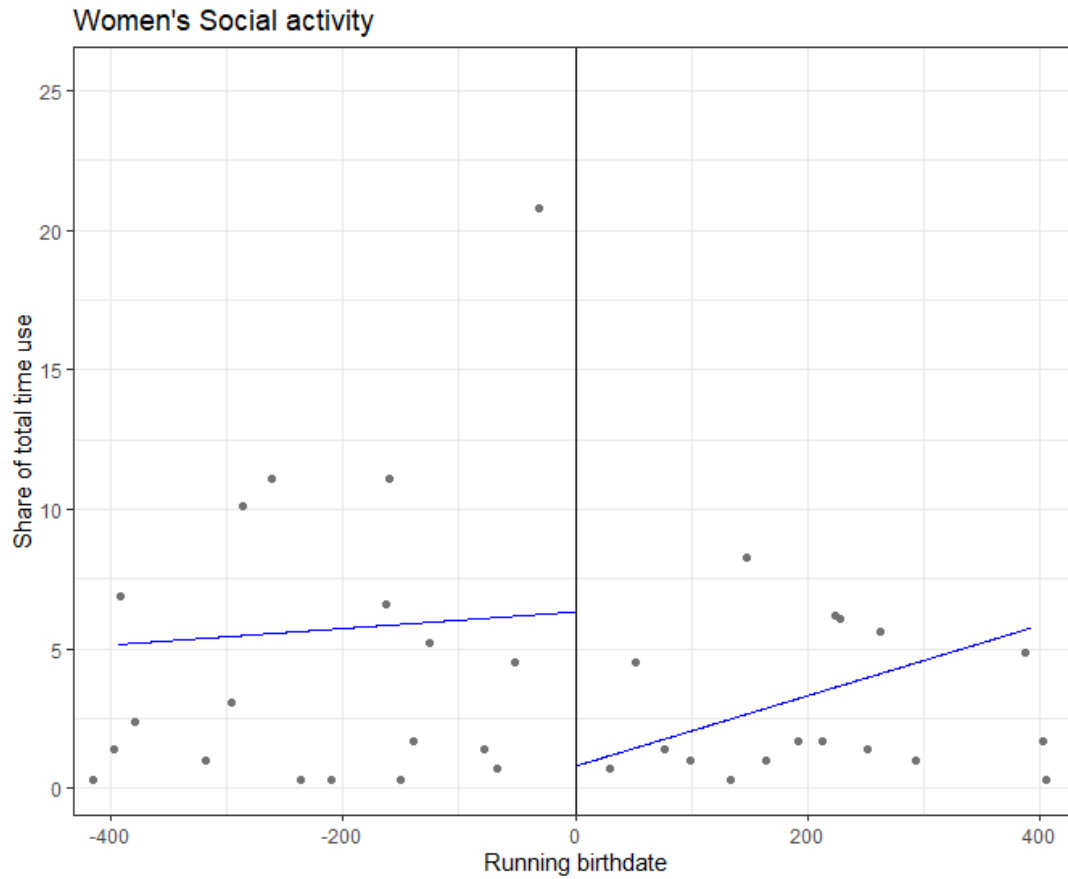
(a) RDD Plot

```
Number of Obs.                    177
BW type                          cerrd
Kernel                      Triangular
VCE method                          NN

Number of Obs.                     66            111
Eff. Number of Obs.                14             14
Order est.  (p)                     1              1
Order bias  (q)                     2              2
BW est.  (h)                  289.833        289.833
BW bias  (b)                  654.610        654.610
rho (h/b)                       0.443          0.443
Unique Obs.                        63            109

================================================================
     Method     Coef. Std. Err.        z      P>|z|    [ 95% C.I. ]
================================================================
 Conventional   -9.530      5.101   -1.868      0.062  [-19.528 ,  0.468]
Bias-Corrected  -10.503     5.101   -2.059      0.039  [-20.501 , -0.505]
      Robust    -10.503     5.730   -1.833      0.067  [-21.734 ,  0.728]
================================================================
```
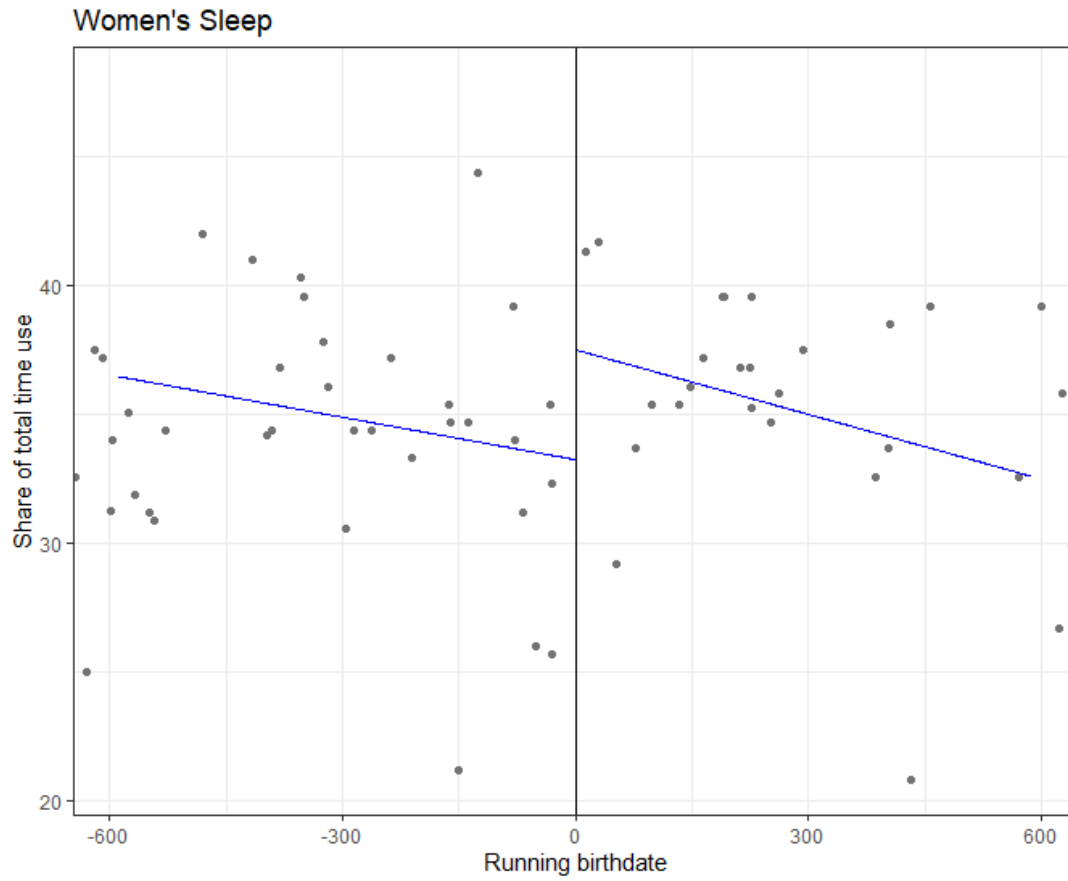
(b) RDD summary

Figure 12: Effect on social activity for women

Women's Sleep

(a) RDD Plot

```
Number of Obs.                    216
BW type                     cercomb2
Kernel                    Triangular
VCE method                        NN

Number of Obs.             82             134
Eff. Number of Obs.        15              18
Order est.  (p)             1               1
Order bias  (q)             2               2
BW est.  (h)          268.816         334.332
BW bias  (b)          587.631         650.301
rho (h/b)               0.457           0.514
Unique Obs.                77             132

===============================================================================
       Method    Coef. Std. Err.        z      P>|z|     [ 95% C.I. ]
===============================================================================
  Conventional    5.521      2.786    1.982     0.047    [0.062 , 10.981]
 Bias-Corrected   5.506      2.786    1.977     0.048    [0.047 , 10.966]
        Robust    5.506      3.120    1.765     0.078    [-0.609 , 11.622]
===============================================================================
```

(b) RDD summary

Figure 13: Effect on sleep for women

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