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# 1 The Effect of Housework on Physical Activity during the Transition to Parenthood

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## HOUSEWORK AND PARENTHOOD TRANSITIONS

### **Abstract**

The transition to parenthood is associated with declines in moderate to vigorous physical activity (MVPA) and increases in light PA (LPA). One potential mechanism for this change in PA that occur at the onset of parenthood is housework. We examined housework load and PA levels of three cohorts of couples across 12-months recruited from Victoria, British Columbia, Canada between January 2007 and December 2011. Participants (N=314;102 not expecting a child, 136 expecting first-child, 76 expecting second child) completed baseline demographics and 7-day accelerometry, followed by assessments at 6 and 12 months. Hierarchical linear regression assessed the association between PA, housework and perceptions of partner's workload. New fathers' but not new mothers' housework was positively related to their LPA at 12 months. Perceptions of partners' workload was positively related to new mothers LPA, and negatively related to new fathers MVPA at 12 months. Mediation analysis determined if perceived behavioural control accounts for the relationship between the discrepancy in housework between partners' PA. Results suggest that if a woman perceives their partner to do more housework their own PA increases, whereas for men their PA decreases. These findings highlight the importance of the division of housework on PA for both mothers and fathers.

Key words: physical activity, parenthood, transitions, housework

### 3 INTRODUCTION

4

5

6 Regular physical activity (PA) is associated with the reduction of several major chronic  
7 diseases (e.g., cardiovascular disease, diabetes, and some cancers; Lee et al., 2012). Regular  
8 moderate to vigorous PA (MVPA) results in the greatest health benefits, however, light intensity  
9 PA (LPA) results in beneficial health outcomes such as lower cardiovascular disease and reduced  
10 metabolic risk (Warburton & Bredin, 2016). Despite the known benefits of PA most adults are  
11 not sufficiently active to attain improvements in health. Indeed, less than 20% of Canadian  
12 adults are meeting the requirements of 150 minutes of MVPA per week, (Clarke, Colley,  
13 Janssen, & Tremblay, 2019).

14 Life transitions, and in particular the transition to parenthood is associated with a decline  
15 in PA (Rhodes & Quinlan, 2015). Overall, parents engage in less MVPA but more LPA than  
16 non-parents (Candelaria et al., 2012; Gaston, Edwards, Doelman, & Tober, 2014; Rhodes,  
17 Blanchard, Benoit, Levy-Milne, Naylor, Downs, et al., 2014). For mothers, the results are  
18 relatively consistent: they are more likely to achieve greater LPA than women without children,  
19 and mothers expecting a second child achieve greater LPA than new mothers (Rhodes et al.,  
20 2014a). Less research has examined PA levels in fathers, and the existing studies yield  
21 inconsistent findings. Specifically, some studies demonstrate that new fathers have a decline in  
22 PA that is equal to (Berge, Larson, Bauer, & Neumark-Sztainer, 2011) or even greater than new  
23 mothers (Hull et al., 2010). Cross sectional research indicates that fathers engage in more LPA  
24 than men without children, (Gaston et al., 2014) whereas longitudinal research found this  
25 relationship was not present for fathers (Rhodes et al., 2014a). Despite mixed research findings  
on the effects of fatherhood on PA, existing evidence warrants continued exploration.

## HOUSEWORK AND PARENTHOOD TRANSITIONS

26           Despite emerging evidence for an inverse relationship between parenthood and PA,  
27 (Bellows-Riecken & Rhodes, 2008; Rhodes et al., 2014a) limited research examines the  
28 determinants of PA within samples of parents. Many factors influence parent's PA, with lack of  
29 energy, lack of time, childcare duties and housework load frequently cited as the main barriers to  
30 PA for parents (Mailey, Huberty, Dinkel, & McAuley, 2014). Additionally, parents are more  
31 likely to postpone PA when family and household responsibilities reduce their available leisure  
32 time (Nomaguchi & Bianchi, 2004). Fathers spend disproportionately more time in leisure while  
33 mothers take on more housework and childcare burdens (Bittman & Wajcman, 2000). As such,  
34 women may have fewer opportunities than men to engage in PA. Importantly, when new mothers  
35 do spend time in leisure activities, they are more likely to do so at home, be interrupted more so  
36 than men and also be completing other family responsibilities simultaneously (Bittman &  
37 Wajcman, 2000; Offer, 2016). This reduced time and quality of PA may have adverse impacts on  
38 the mental and physical health of mothers (Armstrong & Edwards, 2003; Larson-Meyer, 2002;  
39 Wegner et al., 2014). The reduced leisure time and concurrent increase in household activities  
40 may be a possible mechanism that accounts for changes in PA across the transition to  
41 parenthood. Specifically, reduced leisure time and postponement of PA will likely result in less  
42 participation in MVPA which is most often accumulated through exercise. Increases in LPA,  
43 especially for new mothers may be the result of the increases in household activities which are  
44 characterized by light intensity activity (e.g., cooking, cleaning and laundry). Importantly,  
45 increases in LPA may indicate that parents are still achieving activity levels to gain some health  
46 benefits, even if they are not attaining recommended levels of MVPA.

47           The onset of parenthood affects the amount of housework differently for mothers and  
48 fathers. Specifically, mothers see either no change (Gjerdingen & Center, 2005) or a substantial

## HOUSEWORK AND PARENTHOOD TRANSITIONS

49 (32%) increase in housework load (Yavorsky, Kamp Dush, & Schoppe-Sullivan, 2015); whereas  
50 fathers see no change (Gjerdingen & Center, 2005) or a decline (Kluwer, Heesink, & Van de  
51 Vliert, 2002) of approximately 5 hours per week (Yavorsky et al., 2015). In addition, parents of  
52 two children engage in more housework than parents with one child (Sternfeld, Ainsworth, &  
53 Quesenberry, 1999) and each additional child reduces the likelihood that parents participate in  
54 PA (Humphreys, Ruseski, Humphreys, & Ruseski, 2010). As women continue to engage in  
55 greater proportions of housework, there is potential for housework to have greater implications  
56 on PA for new mothers than fathers, reflected to a greater extent in LPA than MVPA.

57         Gender differences in the division of household labor also has adverse impacts on  
58 relationship satisfaction, well-being and health (Klumb, Hoppmann, & Staats, 2006a).  
59 Importantly, perceived discrepancies in workload results in marital conflict more so than  
60 absolute time spent by partners in housework and can lead to resentment and animosity among  
61 women toward their partners (Stazdins & Broom, 2004). Perceived discrepancies in the  
62 housework completed by partners may leave women feeling as though they do not have time for  
63 PA and may have a negative impact on MVPA. As increases in workload are inevitable after the  
64 birth of a child, perceptions of control may be especially important. Perceived behavioral  
65 control (PBC) refers to the extent to which an individual perceives their behaviour to be under  
66 their volitional control (Ajzen, 1991) and predicts intentions and actual behaviour (Ajzen, 1991).  
67 Research has shown that in new mothers specifically, that PBC is an important factor that  
68 underlies the decision to be physically active (McIntyre & Rhodes, 2009). In addition, new  
69 mothers that continue to be active post partum have higher levels of perceived control than non  
70 active mothers, with specifically control beliefs about time, fatigue and social support underlying  
71 feelings of PBC (McIntyre & Rhodes, 2009). Therefore, high levels of PBC may attenuate

## HOUSEWORK AND PARENTHOOD TRANSITIONS

72 potential negative impacts of perceived discrepancies in housework load on PA, especially for  
73 new mothers.

74         To our knowledge, no research has examined the relationship between housework and  
75 PA across transitions to parenthood. Reductions in PA associated with parenthood have  
76 detrimental effects on health and quality of life among parents. First-time parents represent a  
77 population who could greatly benefit from the effects of physical activity due to parenthood  
78 being associated with decreased sleep, increased stress, anxiety and reduced mental well-being  
79 Understanding the relationships between housework load between partners on PA levels, may  
80 highlight potential targets of PA interventions among parents.

81         Current physical activity research in parenthood has certain limitations. First, most of the  
82 research has included exclusively mothers, resulting in the relationships between PA and  
83 parenthood understudied in fathers, however, the limited research that does exist indicates that  
84 fathers' PA is also influenced by parenthood. Research has not examined the direct link between  
85 household workload and PA. While housework may increase differentially, the effect this has on  
86 PA is not well understood. Thirdly, research has not examined if housework is encompassed in  
87 PBC, which may be particularly important to engaging in PA when partners perceive that the  
88 workload is discrepant. This may be especially true for mother's who have less leisure time,  
89 (Nomaguchi & Bianchi, 2004; Parker & Wang, 2011) and take on most of the housework load  
90 (Fox, 2009; Saxbe et al., 2011). In motherhood, PBC was related to continued PA after having a  
91 child (McIntyre & Rhodes, 2009). Perception of discrepancies between an individual's and their  
92 partner's housework levels on PA may be attenuated by PBC.

93         In addition to the above limitations, the majority of research in parenthood and PA has  
94 used cross-sectional designs (Bellows-Riecken & Rhodes, 2008) and self-report measures of PA

## HOUSEWORK AND PARENTHOOD TRANSITIONS

95 resulting in biased and exaggerated estimates of PA. Research using direct objective  
96 measurement of PA (accelerometry) has found no cross-sectional differences in MVPA in  
97 parents compared to couples without children (Candelaria et al., 2012) whereas longitudinal  
98 research showed that mothers completed more LPA than women without children but not fathers  
99 (Rhodes et al., 2014a).

100         This study attempts to improve on the limitations of previous research by employing a  
101 prospective longitudinal study over 12 months with three cohorts of couples (couples without  
102 children, first time parents and parents expecting their second child) using objective PA  
103 measurement and considering both mothers and fathers, as well as exploring perceptions of their  
104 own workload and how much they perceived their partner to do over time. The aims of this study  
105 was : 1) to assess how housework load changes over the transition to parenthood,2) To examine  
106 if household workload and perceptions of a partner's household workload was associated with  
107 PA behaviour over 12 months between those without children, new parents, and established  
108 parents, 3) To assess if discrepancies between partners in their perceived time spent doing  
109 housework affected PA levels, and 4) To assess whether the effect between discrepancy in  
110 housework and physical activity is attenuated by PBC.

111 Hypotheses:

- 112         1. That housework load would increase over the transition to parenthood.
- 113         2. Housework load and perceptions of partner's housework load would be negatively  
114             related to MVPA and positively related to LPA for mothers compared to women  
115             without children and to an even greater extent when compared to fathers and men  
116             without children.



## HOUSEWORK AND PARENTHOOD TRANSITIONS

117           3. The discrepancy between perceptions of housework load would be negatively related  
118           to MVPA and LPA, particularly in mothers.

119           4. That PBC would mediate the relationship between discrepancy in housework load  
120           and MVPA and LPA, particularly for mothers.

### 121 **METHODS**

#### 122 **Participants**

123           The participants in this study are part of a larger study on lifestyle changes and  
124           parenthood. Previous publications using this data set have examined motivation for healthy  
125           eating during parenthood (Bassett-Gunter et al., 2013) and PA and sedentary behaviour (Rhodes  
126           et al., 2014a). Different from previously reported, this current study examined a possible  
127           mechanism (housework) for decreases in MVPA and increases in LPA including PA and  
128           perceptions of housework load and the influence of PBC on PA in the context of housework load  
129           during parenting transitions. One hundred and fifty-seven couples (N = 431) between the ages of  
130           25-40, without children or with one child were recruited between January 2007 and December  
131           2011. Participants included those who were not expecting to have a child (n = 102), expecting  
132           their first child (n = 136) and those who were expecting a second child (n = 76). Exclusion  
133           criteria included single parents and mothers with health complications during pregnancy (e.g.,  
134           gestational diabetes, pre-eclampsia, etc.).

#### 135 **Procedures**

136           More procedural details for this study can be found in prior publications (Bassett-Gunter  
137           et al., 2013; Rhodes et al, 2014a; Rhodes et al, 2014b). Recruitment of participants occurred at  
138           medical clinics, coffee shops, on parenthood lists, and through outreach programs for parents and  
139           baby retail outlets. Couples without children were targeted through advertisements at recreation

## HOUSEWORK AND PARENTHOOD TRANSITIONS

140 centres, newspaper advertisements, coffee shops and purchase lists (e.g., craigslistvictoria.com).  
141 Recruitment and data collection occurred January 2007 to December 2011. PA was measured at  
142 three time points. Specifically, for parents, PA was measured during pregnancy, 6 months  
143 postpartum and 12 months postpartum and for couples without children at baseline, 6 months  
144 and 12 months. Demographic data was self-reported at baseline, with height and weight self-  
145 reported at each time point. To assess PA, participants were fitted with an accelerometer that was  
146 delivered to their home at each time point and then picked up when wear time was reached. The  
147 study was approved by the Human Ethics Review Board at the University of Victoria and all  
148 participants signed written informed consent.

### 149 **Measures**

150 *Demographic information* was collected at baseline via self-report. Participants indicated  
151 their parent status, the highest level of education achieved (8<sup>th</sup> grade or less, some high school,  
152 high school diploma, vocational school, college/university, professional or graduate degree), age  
153 and annual household income.

154 *Physical activity* was measured objectively using the GT1M Activity monitor at each  
155 time point. Details of this procedure have been described elsewhere (Rhodes et al., 2014a; Rhodes  
156 et al. 2014b). The GTMI Activity monitor has been shown to provide reliable and valid measures  
157 of PA (Abel et al., 2008; Janz, 1994). Participants wore the activity monitor for 7 consecutive  
158 days (5 weekdays and 2 weekend days) from waking in the morning until they went to bed.  
159 Participants were instructed to take the monitor off at night and while swimming or bathing.  
160 Subjects completed a diary/log to identify times that the monitor was removed, unusual  
161 circumstances and structured activity bouts.

## HOUSEWORK AND PARENTHOOD TRANSITIONS

162 Duration and frequency of PA was measured using established accelerometer cut points  
163 for light intensity PA (100-1,951 acceleration counts/min<sup>-1</sup>) and moderate/vigorous intensity  
164 ( $\geq 1,952$  average acceleration counts/min) and collected in 10 minute bouts (Freedson, Melanson,  
165 & Sirard, 1998; Trost, Loprinzi, Moore, & Pfeiffer, 2011).

166 Based on previously defined criteria (Esliger, Copeland, Barnes, & Tremblay, 2005;  
167 Esliger et al., 2010) data were included if there was a minimum wear time of 600 minutes/day  
168 for a minimum of 5 days (1 weekend and 4 weekdays). Data was used when minimum wear time  
169 was not met if detailed information (why and how long) was available and it contributed to the  
170 600min/day requirement. Missing data for weekdays were modeled after the other 4 weekdays,  
171 and missing weekend days were modeling from the existing weekend day (Esliger et al., 2005).

172 *Perceived behaviour control.* Control beliefs were measured using prior published  
173 protocols (Rhodes et la, 2014b). Participants responded to questions regarding their confidence  
174 and/or control over being regularly physically active (meaning 150 minutes per week on a Likert  
175 scale ranging from 1 “strongly disagree” to 5 “strongly agree”. Participants rated their  
176 agreement with the stem statement “During the next 6 months .....” for the following three items:  
177 1) I am completely confident that I could be physically active on a regular basis, 2) I am in  
178 complete control as to whether or not I am physically active on a regular basis, and 3) It would  
179 be extremely easy for me to be physically active on a regular basis. Participants then rated their  
180 agreement to eight items preceded with the statement “During the next 6 months it will be  
181 extremely easy for me to be physically active each day even if 1) I have house related work, 2) I  
182 have to work, 3) I don’t have the time, 4) I feel too tired, 5) I have no one to be physically active  
183 with, 6) I have cost/financial concerns, 7) I have health problems, 8) If the weather is bad. An  
184 overall score of perceived behavioural control was calculated by averaging scores for all the

## HOUSEWORK AND PARENTHOOD TRANSITIONS

185 items. In the current study, Cronbach's  $\alpha$  demonstrated reliability at baseline ( $\alpha = .85$ ), 6 months  
186 ( $\alpha = .80$ ) and 12 months ( $\alpha = .82$ ).

187 *Household workload.* Participants rated how much of the household workload they  
188 completed in six domains: 1) meal prep last week, 2) cleaning last month, 3), Car maintenance  
189 last year, 4) managing bills past year, 5) yard work last year, 6) laundry last month. The items  
190 were scored on a 6-point Likert scale ranging from 1 ("none") to 6 ("all") with zero being not  
191 applicable. In addition, they used the same scale and rated how much housework they perceived  
192 their partner to do. Housework was measured at 6 and 12 months. This questionnaire was  
193 developed for the purpose of this study.

### 194 **Analysis Plan** 195

196 Housework and MVPA and LPA had significant positive skewness and kurtosis and thus were  
197 transformed using the square root which resulted in normalizing the data. A missing value  
198 analysis indicated that missing data (Little MCARs test and t-tests) was missing completely at  
199 random. As such, missing data (20%) was imputed using expectation maximization (Allison,  
200 2002). The imputation was completed prior to transforming the variables for normality.  
201 Pearson's correlations were calculated to examine potential covariates of PA including age,  
202 income, and childcare responsibilities. Spearman's rank correlations were calculated for  
203 categorical variables that included education and employment status.

204 Men and women were analyzed separately. All identified covariates were controlled for  
205 in the appropriate analyses.

### 206 *Examining differences and changes in housework during transitions in parenthood (6-12* 207 *months)*

## HOUSEWORK AND PARENTHOOD TRANSITIONS

208           Multivariate ANOVA (MANOVA) was used to assess differences in overall and  
209 individual housework domains for participant housework load and perceptions of partners'  
210 housework at 6 and 12 months. Within and between groups (without children, new parent,  
211 established parent) were assessed. As the housework domains were not additive and may not  
212 have reflected equal amounts of work (e.g. car maintenance versus managing bills) we also  
213 assessed differences in individual household domains. Repeated-measures MANOVAs examined  
214 changes over time between 6 and 12 months in housework, perceived partner housework, and the  
215 discrepancy between participants and perceived partner house workload.

### 216 *Examining housework as a predictor of PA levels in parenthood transitions*

217           Hierarchical linear regression modelling was used with MVPA and LPA (6 months and  
218 12 months) as the dependent variables. PBC and covariates were entered on the first step of the  
219 regressions. The second step included housework load and perceived partner housework load.  
220 Separate regression equations were calculated for men and women and for each parent status  
221 group. These analyses were completed for both overall housework load and individual  
222 housework domains.

### 223 *Examining the discrepancy in housework across parenthood transitions with PBC as possible* 224 *mediator*

225           Discrepancy scores were calculated by subtracting the perceived partner housework load  
226 score from the housework load score for the respondent themselves (respondent housework-  
227 Perceived partner housework) to form the independent variable at both 6 and 12 months. This  
228 was done for both men and women. Positive scores indicated that the participant perceived  
229 themselves as doing more housework than their partner, with negative scores indicating that the  
230 participant perceived themselves to do less housework than their partner. The mediator in this

## HOUSEWORK AND PARENTHOOD TRANSITIONS

231 analysis was PBC. Mediation analysis was conducted using the PROCESS macro (model  
232 4(Hayes, 2013) which employs bootstrapping to estimate the size of direct and indirect effects  
233 using adjusted percentile (asymmetrical) confidence intervals. Significance of the indirect effect  
234 was tested using a bias –corrected bootstrap confidence interval based on 10,000 bootstrap  
235 samples. A mediation effect was deemed significant if the upper and lower 95% Confidence  
236 Interval limit of the size of the indirect path did not include zero. The mediation analysis was  
237 represented by two equations:  $M = i_1 + aX + e_M$ , and  $Y = i_2 + c'X + bM + e_Y$ .

### 238 **Results**

239 Age and income were different by parent status (Table 1). Non-parents made  
240 significantly less money than new and established parents. However, new and established parents  
241 were not different from each other. In addition, non-parents were significantly younger than new  
242 and established parents, while neither of them differed from each other by age. [insert table 1  
243 near here]

244 A 10% attrition rate was apparent at the 6-month data collection in which 15 couples did  
245 not return across parent groups: Couples without children (n = 8), couples who had their first  
246 child (n = 5) and couples having their second child (n = 2). Drop out occurred because the  
247 couples moved away (n = 2), they were too busy (n = 3), the relationship dissolved (n = 2),  
248 health complications (n = 1) and undisclosed reasons (n = 7). At 12 months an additional 12  
249 couples did not return representing an 8% attrition rate. Drop out occurred for couples without  
250 children (n = 5), couples who had their first child (n = 5) and couples having their second child  
251 (n = 2). Reasons for drop out were that the couple moved away (n = 2), they were too busy (n =  
252 1), the relationship dissolved (n = 4), health complications (n = 1) and undisclosed reasons (n =  
253 4).

## HOUSEWORK AND PARENTHOOD TRANSITIONS

### 254 *Covariates*

255 Education was the only significant covariate of PA for men and related to 6-month  
256 MVPA only (Spearman's  $r = 0.21$ ,  $p < 0.05$ ). No significant covariates were present for women.

### 257 *Differences and change over time in housework*

#### 258 *Differences in parent's status and gender for housework.*

259 We found no significant gender-based differences in overall in overall housework load  
260 across time; however, individual housework domains differed significantly at both six and 12  
261 months. Specifically, significant gender differences were found at 6 months ( $F_{(12, 238)} = 23.03$ ,  $p$   
262  $< 0.001$ ), and 12 months ( $F_{(12, 215)} = 22.18$ ,  $p < 0.001$ ). There was also a significant interaction  
263 between parent status and gender at 6 months ( $F_{(24, 478)} = 3.01$ ,  $p < 0.001$  and 12 months ( $F_{(24,$   
264  $432)} = 3.13$ ,  $p < 0.001$ ). Specifically, at 6-months women without children completed significantly  
265 more meal prep and cleaning than men without children. Established mothers also did more meal  
266 prep than established fathers. In terms of perceptions of partners' workload, new mothers  
267 perceived their partners as doing more bill management, whereas new fathers perceived their  
268 partners as doing more meal prep. Established mothers perceived their partners as doing more  
269 car maintenance and yard work, and established fathers perceived partners as doing more meal  
270 prep and cleaning. [insert figures 1 and 2 near here]

271 At 12-months, new mothers did more cleaning than new fathers and established mothers  
272 did more meal prep, cleaning and bill management, whereas established fathers did more car  
273 maintenance and yard work. In terms of perceptions of partners workload at 12-months, new  
274 fathers perceived their partners as doing more meal prep and cleaning and established mothers  
275 perceived partners as doing more yard work (Table 2).

276 [Insert table 2 near here]

## HOUSEWORK AND PARENTHOOD TRANSITIONS

277 *Change over time.*

278           Housework load or perceptions of partners housework for men or women did not change  
279 significantly overtime. New-mothers perceived their partners as doing more housework (M=  
280 18.32) than the partners of non-mothers (M= 15.4,  $p=0.006$ ), with no differences between the  
281 perceptions of new mothers and established mothers (M=18.72). The interaction between  
282 housework load and parent status for the respondent's housework and their perceived partner's  
283 housework load was also not significant for both genders (Table 3). [insert table 3 near here]

284 ***Housework predicting PA levels in parenthood transitions***

285 ***Bivariate Correlations***

286           Bivariate correlations are presented in Table 4. MVPA at six months was negatively and  
287 weakly correlated with housework (meal prep,  $r = -0.12$ ; cleaning,  $r = -0.12$ ; and laundry,  $r = -$   
288  $0.14$ ) and positively correlated with perceptions of partners housework at 6 months for cleaning  
289 ( $r = 0.12$ ), and laundry ( $r = 0.14$ ), but negatively correlated with car maintenance( $r = -0.16$ ). In  
290 addition, 6-month MVPA was positively and moderately correlated with the discrepancy in  
291 housework between partners ( $r = .26$ ). Twelve-month MVPA was negatively and weakly  
292 correlated with laundry ( $r = -0.14$ ) and positively and weakly correlated with perceptions of how  
293 much laundry and cleaning  $r = 0.14$ ) the partner completed at 12 months. [insert table 4 near  
294 here]

295 ***Men***

296           For new fathers', overall housework load was negatively related to LPA at 12-months ( $\beta$   
297  $= -0.38$ ,  $p = 0.017$ ), and perception of partners overall housework load ( $\beta = -0.37$ ,  $p = 0.018$ ) was  
298 negatively related to their levels of MVPA at 12-months. Examining the individual housework  
299 types indicated that the amount of car maintenance ( $\beta = -0.40$ ,  $p = 0.018$ ) new fathers completed



## HOUSEWORK AND PARENTHOOD TRANSITIONS

300 was negatively related to their LPA at 12-months. Perception of how much of the car  
301 maintenance ( $\beta = 0.39$ ,  $p = 0.043$ ) their partners did was positively related to new father's  
302 MVPA at 12-months. No other relationships were significant. The effects of partner's  
303 perceptions of housework on established fathers 6-month MVPA ( $\beta = -0.35$ ) and LPA ( $\beta = -0.36$ )  
304 were moderate in size, however, not significant. (Table 5). [insert table 5 near here]

### 305 *Women*

306 For women, overall housework load was not significantly related to PA at either 6 or 12  
307 months. The only significant housework relationship was between perceptions of partner's  
308 housework load and LPA among new mothers. Their perceptions of partner's housework load ( $\beta$   
309  $= 0.46$ ,  $p = 0.045$ ) was related to levels of LPA at 12 months. Specifically, perceptions of how  
310 much car maintenance their partners did was positively related to 12-month LPA whereas has  
311 how much they thought their partners did managing bills was negatively related to 12-month  
312 LPA. Although housework variables and MVPA were not significantly related, the regression  
313 coefficient effect sizes were moderate for the 12-month MVPA ( $\beta = -0.31$ ) of new mothers, and  
314 of established mothers ( $\beta = -0.34$ ). This was also true for LPA among established mothers ( $\beta = -$   
315  $0.31$ ).

### 316 ***Discrepancy in housework across parenthood transitions with PBC as possible mediator***

317 Discrepancy in the respondents' perceptions of their overall housework load compared to  
318 their partners was directly and negatively related to 6-month MVPA for new mothers ( $b = -8.55$ ,  
319  $p = 0.029$ ). No other direct relationships were significant for women or men. In addition, PBC  
320 did not mediate any relationships for women or men regardless of parent status. Thus, PBC did  
321 not account for the relationship between the discrepancy of housework for non-parents, new  
322 parents or established parents.

### 323 **DISCUSSION**

324           The onset of parenthood is associated with declines in PA (Rhodes & Quinlan, 2015),  
325 however little research has examined the determinants of PA change during parenthood. One key  
326 responsibility for parents that affects leisure time is housework. The objective of this study was  
327 to prospectively and longitudinally examine housework load and perceptions of housework load  
328 in relationship to PA for non-parents, first time parents and established parents and comparing  
329 mothers and fathers. Our findings contrast other research showing that parenthood results in a  
330 substantial increase in housework, albeit for new mothers (Yavorsky et al., 2015) when measured  
331 in hours. Discrepancies between the current findings and previous research may be the result of  
332 the type of assessment. In line with some previous research (Gjerdingen & Center, 2005), the  
333 current study used survey response data, whereas Yavorsky and colleagues (Yavorsky et al.,  
334 2015) used time logs which tend to be more accurate. Additionally, the current study used  
335 proportion of housework completed by each partner across domains. Therefore, it is possible that  
336 the actual time spent completing housework increases, but the proportion does not, with women  
337 still completing most of the household labour. Discrepancies may also exist as a result of the  
338 timing of assessments. The current study assessed housework at six months and 12 months;  
339 therefore, changes from pregnancy to six months postpartum may have been missed.

340           Our study went beyond self-reported housework load to look at the influence of  
341 perceptions of workload. Commensurate with reported housework load although new and  
342 established mothers perceive their partners to do more of the overall housework load than non-  
343 fathers, mothers reported completing more of the housework tasks that occur more frequently  
344 (e.g., daily, weekly, or monthly) such as meal prep, cleaning, and laundry than fathers. Despite  
345 overall housework load not changing over time and regardless of parenthood status, our study

## HOUSEWORK AND PARENTHOOD TRANSITIONS

346 suggests that housework remains gendered (Fox, 2009) such that women tend to complete more  
347 housework tasks that have historically been considered under the female domain (i.e., meal prep,  
348 laundry and cleaning).

349         The first aim of the study was to determine how housework changed over parental  
350 transitions and how housework was related to PA. The reduced leisure time and concurrent  
351 increase in household activities may be a possible mechanism that accounts for changes in PA  
352 across the transition to parenthood. Contrary to our own prediction but consistent with the work  
353 of Gjerdingen & Center (2005) we found that housework load did not significantly change over  
354 time. Similarly, we found only partial support for our hypotheses that housework would be a)  
355 associated with LPA and b) negatively related to MVPA in parents compared to non-parents and  
356 no support for c) this being to a greater extent in mothers than fathers. More specifically we saw  
357 the predicted effect only among new fathers; where their housework load was negatively related  
358 to their LPA only at 12 months after birth. A more focused analysis of these responsibilities  
359 showed car maintenance responsibilities were negatively related to the LPA of new fathers at 12  
360 months. This is confusing as car washing and car repairs, done at home involve LPA (Ainsworth  
361 et al., 2011). Potentially, new fathers are using service centers which involves sitting and waiting  
362 for the work on their car to be complete, which would reduce their LPA.

363         Mothers reported more housework load in our study and tended to have less leisure time  
364 than fathers in other studies (Bittman & Wajcman, 2000). Women often complete housework  
365 completed during their time available for leisure (Offer, 2016) and as a result women may  
366 perceive that they have less time for PA. Despite these perceptions the prior reported primary  
367 analysis using these data found that new mothers actually increased their LPA levels over 12  
368 months, similarly to the levels achieved by established mothers (Rhodes et al., 2014a).

## HOUSEWORK AND PARENTHOOD TRANSITIONS

369 Complicating the picture is that perceptions of partners' workload was also a factor and related  
370 to new fathers MVPA 12 months after birth and LPA for new mothers 12 months after birth but  
371 in opposite directions. Women who perceive their partners to do more housework may feel more  
372 supported and that they have some time for themselves to engage in activity, whereas men may  
373 feel guilty if they perceive that their partner's are doing more resulting in a negative impact on  
374 their MVPA. However, more exploration is needed to understand the psychological processes.

375 In line with the exploration of perceptions of workload, the third objective of this study  
376 assessed the influence of perceived discrepancy between amount of housework load between  
377 men and women and its association with PA levels. Our results highlight the importance of the  
378 interaction between parent roles and responsibilities, indicating that the difference between  
379 mother's and father's perceived housework load was relatively small. However, this small  
380 difference was still negatively associated with the MVPA of new mothers. Specifically, the  
381 discrepancy in workload was negatively related to MVPA at six months for new mothers, but not  
382 for fathers. New mothers spend a significant amount of time engaged in childcare and the results  
383 suggest that even a small perceived discrepancy is related to MVPA. The weaker relationships  
384 than predicted found for mothers may be the result of housework being more evenly distributed,  
385 which disrupts father's available leisure time. However, childcare is predominantly done by  
386 mother's and represents a significant burden on time.

387 As perceptions may be an important psychological mechanism influencing behaviour the  
388 third objective of this study was to assess the role of PBC in accounting for the relationships  
389 between perceived discrepancies in housework and PA. Previous research has found that mothers  
390 with higher PBC (McIntyre & Rhodes, 2009) and self-efficacy (Cramp & Bray, 2011) were more  
391 active. Contrary to expectations, PBC did not mediate the relationship between perceived

## HOUSEWORK AND PARENTHOOD TRANSITIONS

392 discrepancy in housework load and PA for mothers or fathers. The current results indicate that  
393 PBC to be physically active and the discrepancy in housework between mothers and fathers were  
394 not related. Potentially, when responding to questions regarding control beliefs, people may not  
395 think of all aspects of housework they engage in, such as meal prep, or car maintenance, or bill  
396 management. This suggests that typical social cognitive measures of control such as PBC may  
397 not account for housework aspects and thus under-estimate perceptions of limiting factors to PA.  
398 Competing responsibilities, may be seen as a barrier to PA for parents (Mailey et al., 2014) and  
399 are often not equivalent with perceptions of control (Rhodes, Quinlan, & Mistry, 2016).  
400 Potentially, other demands on parents' time, not included in our definition of housework such as  
401 childcare responsibilities may be more salient and remaining active may require an individual to  
402 have higher perceptions of control. Most housework can be scheduled as required for parents,  
403 whereas childcare responsibilities may be more outside one's volitional control. Thus, helping  
404 parents and especially mothers to establish a balance between PA and housework around  
405 established childcare time may be an avenue for PA interventions for parents. The findings  
406 suggest that entrenched routines at the individual level and gender-based differences (Fox, 2009)  
407 have a greater impact on housework load and PA than partner differences.

408         The longitudinal design and objectively measured PA are methodological strengths of  
409 this study, as well as the inclusion of perceptions of partners housework are important  
410 contributions to the literature. One study limitation is that the sample was more educated and  
411 more physically active than the average Canadian adult in other population samples. Effects of  
412 housework may be even more apparent on PA within samples of people who are less active, and  
413 housework may vary by social economic status, so the results may not generalize across diverse  
414 populations. However, given that significant estimates were found, these likely represent

## HOUSEWORK AND PARENTHOOD TRANSITIONS

415 conservative estimates of population effects. Second, a longer time frame for the study may be  
416 warranted. Research not only indicates that PA declines over the first five years (Bellows-  
417 Riecken & Rhodes, 2008) but also as children move from infants to toddlers the housework  
418 demands may increase, given that after the first year children are eating more adult style meals,  
419 walking and more involved in play. However, examining a 12 month time frame allowed us to  
420 see immediate changes in PA at the onset of parenthood, that may be lost in longer term follow-  
421 ups (Hull et al., 2010). Future research may want to examine how partners perceive the fairness  
422 of the distribution of workload. If partner's, particularly the one doing the greater proportion of  
423 housework, feel that the distribution is fair, discrepancies may not have negative impact on PA.  
424 In addition, splitting the sample into males and females and then again into new parents and  
425 established parents, resulted in decreased group sizes. This is particularly apparent for the  
426 established parents group and although we found medium effect sizes (Cohen, 1992) they were  
427 not significant, likely due to sample size limitations. It should be noted that we separated  
428 housework from childcare responsibilities which have been shown to be discrepant across the  
429 sexes. It may be that the influence on PA is childcare related and housework is indeed more  
430 equitably distributed causing a perturbation in men's behaviour. Indeed, excluding childcare  
431 from housework may influence the interpretation of the results as the primary interference may  
432 be from childcare which increases father's involvement in housework and compresses  
433 housework into smaller time frames and reduces non childcare leisure time opportunities.

434 Mothers appear to be doing more LPA within 1-year post birth of a child and LPA is  
435 associated with health benefits. However, physical activity from housework is weakly associated  
436 with leanness, BMI and health (Murphy, Donnelly, Breslin, Shibli, & Nevill, 2013), compared to  
437 leisure time PA (Abu-Omar & Rütten, 2008). First-time parents represent a population who

## HOUSEWORK AND PARENTHOOD TRANSITIONS

438 could greatly benefit from the effects of physical activity due to parenthood being associated  
439 with decreased sleep, increased stress, anxiety and reduced mental well-being

440         This is one of the first studies we are aware of to examine how housework (reported and  
441 perceived) relates to PA across the transition to parenthood. This study adds to the literature on  
442 parenthood and PA by including comparisons of non-parents, to new and established parents, by  
443 utilizing a longitudinal design and objectively measuring PA, and by including both mothers and  
444 fathers as well as partner perceptions. This study provided evidence that reported housework  
445 load is related to physical activity for fathers only, however, perceptions of partner's housework  
446 appeared to have a stronger relationship with PA in parenthood for both mothers and fathers than  
447 individually reported workload. This finding highlights the importance of the interaction  
448 between a couple and the division of housework labour and that separating childcare  
449 responsibilities from housework may introduce some confusion in the time use and PA  
450 interpretation.

### 451 **Human Subjects Statement**

452 The University of Victoria Research Ethics Board approved this study. All participants provided  
453 written informed consent.

### 454 **Conflict of Interest Statement**

455 The authors have no conflict of interest to declare

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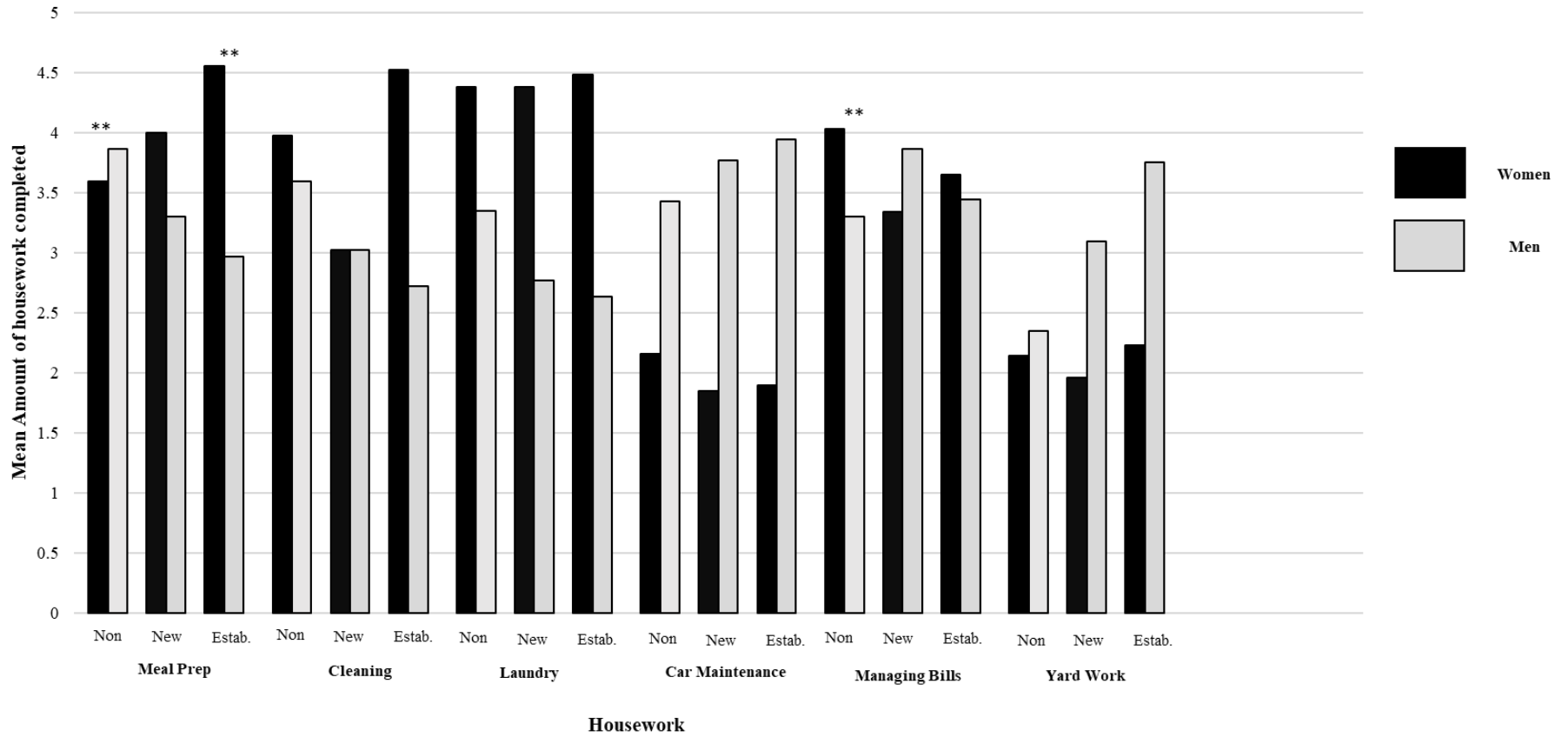
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# HOUSEWORK AND PARENTHOOD TRANSITIONS

Figure 1

Differences in Housework Load by Gender and Parent Status at 6 months

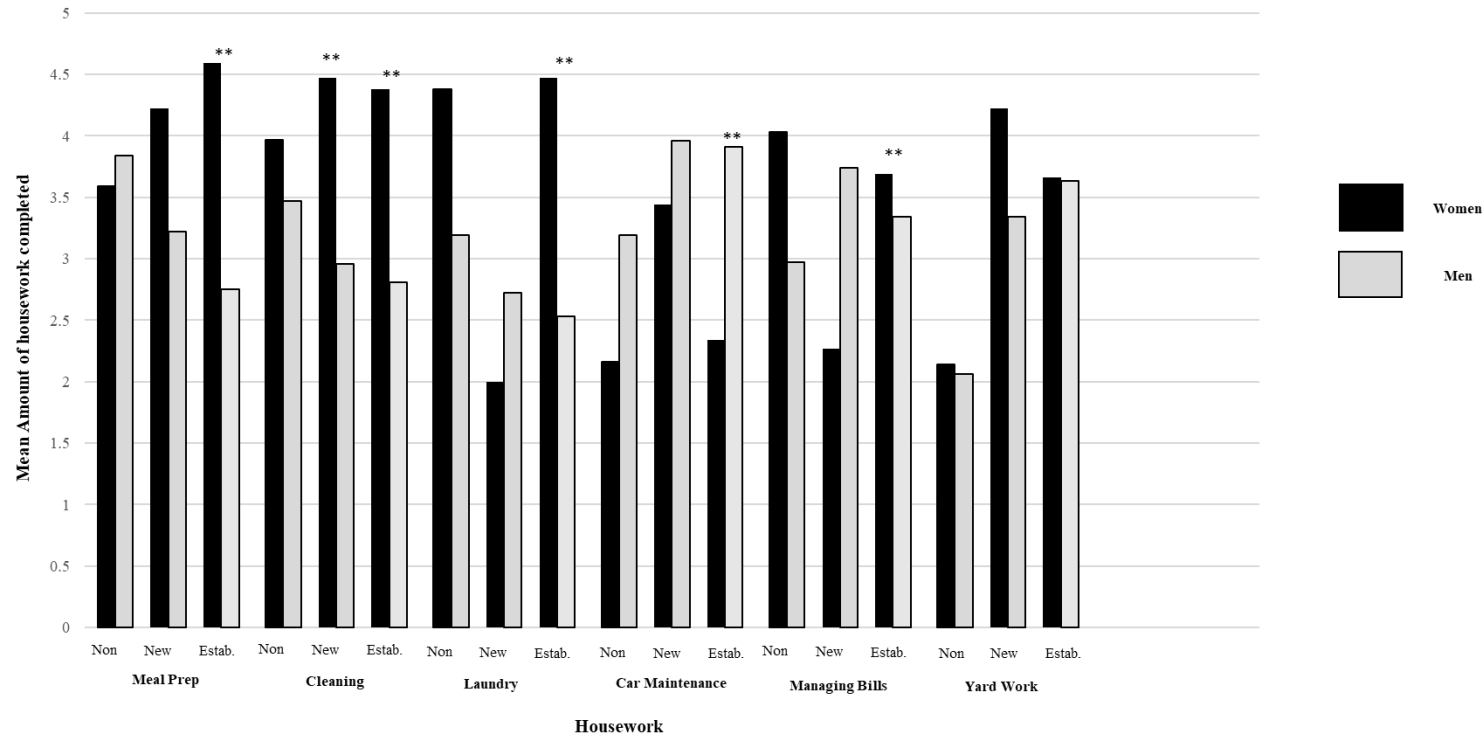


Note: Non, non parents; New, new parents; Estab., Established parents. Significance is denoted as \* for p < .05 and \*\* for p < .001. Amount of housework completed is scored on a Likert scale from 1 (none) to 5 (all).

# HOUSEWORK AND PARENTHOOD TRANSITIONS

Figure 2

Differences in Housework Load by Gender and Parent Status at 12 months



Note: Non, non parents; New, new parents; Estab., Established parents. Significance is denoted as \* for  $p < .05$  and \*\* for  $p < .001$ . Amount of housework completed is scored on a Likert scale from 1 (none) to 5 (all).

HOUSEWORK AND PARENTHOOD TRANSITIONS

Table 1  
Participant Characteristics at Baseline by Gender and Parent Status

	Non-Parent (n = 102)		New-Parent (n = 136)		Established Parent (n = 76)	
	Women	Men	Women	Men	Women	Men
Age ± SD	27.52 ± 5.12	29.65 ± 5.34	31.15 ± 4.75	33.10 ± 4.71	32.18 ± 3.85	34.19 ± 5.00
% Visible minority	6	6	5.6	6	7.8	7.9
% Income > 75,000	43	39.2	62.5	63.2	47.5	57.9
% Completed University	69	62.5	83	70.6	81.5	55.6
BMI ± SD	22.65 ± 2.89	25.48 ± 3.66	24.90 ± 3.14	26.18 ± 3.51	26.49 ± 4.26	26.53 ± 3.52
PBC ± SD	3.48 ± .71	3.49 ± .68	3.59 ± .66	3.50 ± .67	3.21 ± .44	3.35 ± .65
MVPA ± SD	144.43 ± 97.98	152.06 ± 151.76	123.62 ± 112.23	127.24 ± 107.04	73.10 ± 08.97	68.91 ± 119.52
LPA ± SD	866.33 ± 86.64	852.67 ± 82.20	827.15 ± 70.31	1055.49 ± 64.31	903.95 ± 98.24	939.36 ± 85.08

Note: BMI, body mass index; PBC, perceived behavioural control; MVPA, moderate to vigorous physical activity; LPA, light physical activity; perceptions partners housework. Housework and perceptions of housework are scored on a 6 point Likert scale from 1 = none to 6 = all. Discrepancy calculated by (womens workload – mens workload) \* First measured at 6 months.



## HOUSEWORK AND PARENTHOOD TRANSITIONS

Table 2. Differences in Perceptions of Partners Housework Load by Gender and Parent Status at 6 and 12 Months

	Total sample		Non parents		New Parents		Established parents	
	Women (n=159)	Men (n=51)	Women (n=51)	Men (n=51)	New mothers (n=68)	New fathers (n=68)	Established mothers (n=38)	Established fathers (n=38)
Meal Prep	3.08 ±0.09	3.67±0.09**	3.97±1.01	3.24±1.21	2.98±1.32	3.81±.25 <sup>b,**</sup>	2.77±0.85	4.06±1.16 <sup>c,**</sup>
Cleaning	2.78±0.08	3.69±0.08**	4.38±1.14	3.49±0.07	2.66±0.95	3.74±0.99	2.66±0.88	3.91±0.89 <sup>c,**</sup>
Laundry	2.65±0.09	4.0±0.08**	2.16±1.66	3.24±1.21	3.78±1.38	2.56±1.23	4.21±0.18	4.25±1.22
Car	3.22±0.13	1.83±0.13**	4.03±1.28	1.89±1.52	1.89±1.52	3.54±2.06	3.90±1.72 <sup>c,**</sup>	1.72±1.25
Maintenance								
Managing Bills	3.24±0.12	3.31±0.12	2.14±1.80	3.54±1.57	3.54±1.57 <sup>b,**</sup>	3.51±1.74	2.98±1.47	3.50±1.70
Yard Work	2.68±0.09	2.02±0.13	1.89±1.93	1.79±1.64	1.79±1.64	2.54±1.54	.90±1.78 <sup>c,**</sup>	2.60±0.88
<b>Discrepancy</b>	2.22±0.51	1.30±0.53	6.46±6.8	5.87±6.07	1.66±5.36	0.91±3.61	2.1±6.63	-4.12±4.67
<b>Perceptions of Partners Housework at 12 months</b>								
Meal Prep	3.06±0.09	3.74±0.08**	3.19±1.32	3.28±0.92	3.16±1.44	3.90±1.06 <sup>b,**</sup>	2.72± 1.11	4.19± 1.03 <sup>c,**</sup>
Cleaning	2.73±0.08	3.77±0.08**	2.90±1.14	3.56±0.98	2.62±1.08	3.90±1.00 <sup>b,**</sup>	2.41 ± 1.22	4.16± 1.04 <sup>c,**</sup>
Laundry	2.71±0.09	4.08±0.09**	2.61±1.36	3.78±1.00	2.64±1.16	4.30±1.23	2.47 ± 1.14	4.41 ± 1.41
Car	3.12±0.12	1.67±0.12	2.48±2.17	1.53±1.14	3.22±2.05	1.58± 0.99	3.88 ± 1.96	1.53±0.92
Maintenance								
Managing Bills	3.16±0.12	3.37±0.12	2.32±1.30	3.94±1.29	3.55±1.71	3.30±1.65	3.38 ± 1.95	3.48±1.90
Yard Work	2.75±0.12	4.08±0.09**	1.48±1.86	1.59±1.62	3.05±2.05	2.14±1.37	3.63 ± 1.54	2.31±1.09 <sup>c,**</sup>
<b>Discrepancy</b>	1.81±0.53	1.86±0.53	7.46±5.82	7.81±7.87	1.11±2.94	1.12±3.12	-4.11±3.97	-4.82±5.20

Note: Results of the MANOVA for perceptions of partners workload across gender and parent status. Means ± SD for housework variables are presented. Housework is scored on a 6-point Likert scale from 1 = none to 6 = all. Significant difference between men and women for each parental status category are denotes by a, b, or c, depending on parental status: a, men and women without children are different from each other; b, new mothers and fathers are different from each other; c, established mothers and fathers are different from each other. Significance is denoted as \* for p<.05, and \*\* p<.001.

HOUSEWORK AND PARENTHOOD TRANSITIONS

Table 3. Results of the Repeated Measures ANOVAS for Change in Housework, Perceptions of Housework and Discrepancy in Housework Over Time

	Women			Men		
	F	df	<i>p</i>	F	df	<i>p</i>
<b>Housework load</b>						
Housework	0.727	1,105	0.396	0.440	1,105	0.508
Parent Status	0.525	1,105	0.470	0.612	1,105	0.496
Housework x parent status	0.221	2,105	0.802	0.136	2, 105	0.263
<b>Perceptions of partners Housework</b>						
Perceptions of partners housework	0.525	1,105	0.470	0.281	1,105	0.597
Parent Status	<b>0.531</b>	<b>1,105</b>	<b>0.006</b>	0.312	1,105	0.149
Perceptions of partners housework x parent status	1.58	2,105	0.211	0.110	2,105	0.896
<b>Discrepancy in Housework</b>						
Discrepancy in housework	0.592	1,105	0.433	0.549	1,105	0.461
Parent Status	1.96	1,105	0.146	0.292	1,105	0.146
Discrepancy x parent status	0.370	2,105	0.691	0.370	2,105	0.691

HOUSEWORK AND PARENTHOOD TRANSITIONS

Table 4. Correlations Between Physical Activity, Housework and Perceptions of Partners Housework at 6 Months and 12 Months

	Perceptions of partner's housework																			
	Housework 6 months													Housework 12 months						
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. 6 MTH MVPA	1						0.10	0.14*	0.12*	-0.16**	-0.09	-0.11		-0.11*	-0.07	-0.10	0.06	0.05	0.06	
2. 6 MTH LPA	-0.06	1					0.01	0.03	-0.04	0.03	-0.07	-0.05		0.04	-0.01	-0.03	0.07	-0.10	-0.06	
3. 6 MTH PBC	0.64**	0.08	1				0.09	0.09	0.08	0.01	0.02	0.04		0.17**	0.06	0.04	0.02	-0.02	0.07	
4. 12 MTH MVPA	-0.07	-0.07	0.18**	1			0.12*	0.18**	0.18**	-0.14*	-0.10	-0.13*		0.07	0.12*	-0.16**	-0.9	-0.80	-0.06	
5. 12 MTH LPA	0.51**	0.51**	0.21**	0.03	1		0.08	0.02	-0.05	0.00	-0.01	-0.03		0.04	-0.04	-0.02	-0.01	-0.03	-0.03	
6. 12 MTH PBC	0.18**	0.20**	0.61**	0.15**	0.13*	1	0.05	0.08	0.10	0.02	-0.06	0.01		0.07	0.07	0.08	0.02	-0.03	0.04	
<b>Housework 6 months</b>																				
7. Meal Prep	-0.12*	-0.04	-0.07	-0.13*	-0.3	-0.03	-0.77**	-0.32**	-0.34**	-0.17**	0.10	-0.16		-0.59**	-0.31**	-0.26**	0.22**	0.15**	0.06	
8. Cleaning	-0.12*	0.01	-0.07	-0.18**	0.20	-0.06	0.49**	-0.53**	-0.44**	0.31**	-0.04	0.04		-0.32**	-0.42**	-0.40**	0.28*	-0.04	-0.07	
9. Laundry	-0.14*	0.02	-0.10	-0.19**	0.03	-0.14*	0.36**	-0.57**	-0.69**	0.32**	-0.09	0.06		-0.25**	-0.44**	-0.70**	0.28*	-0.15**	0.04	
10. Car Maintenance	0.10	0.05	0.05	0.14*	0.01	0.08	-0.15**	-0.25**	-0.30**	-0.25**	0.01	-0.10		0.17**	0.40**	0.39**	-0.19*	0.02	-0.1	
11. Bill management	0.06	0.08	0.01	0.12*	0.00	0.09	-0.08	0.17*	0.13*	0.07	-0.82*	-0.02		0.00	-0.01	-0.07	-0.04	-0.73**	-0.01	
12. Yard work	0.02	-0.02	0.06	0.02	-0.01	0.04	-0.10	0.14*	-0.16*	0.21*	0.01	0.21**		0.12*	0.13*	0.26**	-0.45**	0.03	0.07	
13. Discrepancy	0.26**	-0.07	0.01	-0.15**	0.05	0.06	-0.02	0.15*	0.08	-0.02	0.01	-0.01	1	-0.04	-0.10	-0.09	0.02	-0.02	-0.08	
<b>Housework 12 months</b>																				
14. Meal prep	-0.13*	0.00	-0.05	-0.09	-0.05	-0.02	0.64**	0.34**	0.26**	-0.18**	0.01	-0.13*	-0.05	-0.85**	-0.40**	-0.35**	0.16*	-0.01	0.08	
15. Cleaning	-0.07	-0.06	-0.11*	-0.11	-0.01	-0.09	0.38**	0.61**	0.54**	-0.32**	0.06	-0.12*	0.01	0.48**	-0.62**	-0.51**	0.30**	-0.05	0.03	
16. Laundry	-0.10	-0.04	-0.09	-0.14*	0.06	-0.10	0.26**	0.41**	0.79**	-0.35**	0.06	-0.18**	0.12*	0.34**	0.00	-0.85**	-0.25**	-0.20**	0.12*	
17. Car Maintenance	0.06	0.02	0.02	0.10	-0.02	0.08	-0.10	-0.17**	-0.27**	-0.68**	0.10	0.17*	-0.07	-0.02	-0.21**	-0.23**	-0.31**	-0.03	-0.15**	
18. Bill management	0.05	0.09	0.04	0.06	0.06	0.07	-0.09	0.03	0.17*	-0.01	0.80**	0.00	-0.01	-0.01	0.09	0.20**	0.09	-0.03	0.03	
19. Yard work	0.06	-0.07	0.06	0.11	-0.02	0.04	-0.06	-0.24**	-0.23**	0.18**	-0.09	0.67**	-0.09	-0.06	-0.08	-0.20**	0.28**	-0.03	0.16**	
20. Discrepancy	0.05	-0.4	0.02	0.07	-0.02	0.14*	0.02	0.05	0.04	0.02	-0.02	-0.08	0.55**	0.01	0.03	0.03	-0.04	0.00	-0.07	

Note: Variables 7-20 in the top row represent perceptions of partner's housework with the top right quadrant (grey) representing correlations between perceptions of partners housework, PBC and physical activity variables, and subjects' own levels of housework. On the left hand column, variables listed vertically on the left represent the subjects own housework levels. MTH, month; MVPA, moderate to vigorous physical activity; LPA, light physical activity; PBC, perceived behavioural control

HOUSEWORK AND PARENTHOOD TRANSITIONS

Table 5  
Results of the Final Models of the Hierarchical Linear Regressions for Women and Men by Parent Status

	Non Mothers				New Mothers				Established Mothers			
	6 Month Physical Activity		12 Month Physical Activity		6 Month Physical Activity		12 Month Physical Activity		6 Month Physical Activity		12 Month Physical Activity	
	MVPA	LPA	MVPA	LPA	MVPA	LPA	MVPA	LPA	MVPA	LPA	MVPA	LPA
	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
<b>R<sup>2</sup></b>	-0.05	0.014	-0.085	-0.096	0.031	0.01	-0.004	0.042	-0.046	-0.106	0.045	-0.008
<b>R<sup>2</sup> Δ</b>	0.034	0.002	0.070	0.009	0.018	0.082	0.048	0.110	0.044	0.059	0.136	0.140
<b>p-value</b>	0.962	0.974	0.522	0.972	0.692	0.204	0.386	0.115	0.663	0.597	0.286	0.295
<b>Variables</b>	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
PBC	0.28	0.39	0.04	0.20	0.341	0.10	0.19	0.09	0.31	0.04	0.15	0.01
Housework	-0.11	-0.05	-0.14	0.08	-0.15	-0.04	0.22	0.38	0.23	0.01	0.06	0.09
Housework Partner	-0.21	-0.05	0.17	0.03	-0.06	0.27	0.32	<b>0.46*</b>	0.05	-0.24	-0.34	-0.3
	Non Fathers				New Fathers				Established Fathers			
	6 Month Physical Activity		12 Month Physical Activity		6 Month Physical Activity		12 Month Physical Activity		6 Month Physical Activity		12 Month Physical Activity	
	MVPA	LPA	MVPA	LPA	MVPA	LPA	MVPA	LPA	MVPA	LPA	MVPA	LPA
	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
<b>R<sup>2</sup></b>	0.212	-0.079	-0.05	0.017	0.121	-0.067	0.130	0.104	0.242	-0.042	-0.076	0.017
<b>R<sup>2</sup> Δ</b>	0.097	.	0.093	0.148	0.068	0.007	0.181	0.152	0.366	0.086	0.024	0.126
<b>p-value</b>	0.253	0.548	0.414	0.233	0.252	0.878	<b>0.023</b>	<b>0.048</b>	<b>0.029</b>	0.389	0.767	.237
<b>Variables</b>	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
PBC	<b>0.54*</b>	0.09	0.000	-0.15	0.00	-0.07	0.12	0.172	0.26	0.12	0.19	0.08
Education	-0.06				-0.08				-0.08			
Housework	0.09	-0.25	-0.01	0.12	0.32	0.00	-0.27	<b>-0.38*</b>	0.10	-0.21	0.15	-0.13
Housework Partner	-0.31	-0.09	0.32	0.32	0.08	0.08	<b>0.39*</b>	0.03	-0.35	-0.36	-0.01	0.29

Note: MVPA, moderate to vigorous physical activity; LPA, light physical activity; PBC, planned behavioural control; \*  $p < .05$ , \*\*  $p < .001$ . Education was a covariate only for 6 month MVPA