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Title: Parenthood and changes in physical activity from early adulthood to mid-life among Finnish adults

Year: 2023

Version: Accepted version (Final draft)

Please cite the original version:

Palomäki, S., Kukko, T., Kaseva, K., Salin, K., Lounassalo, I., Yang, X., Rovio, S., Pahkala, K., Lehtimäki, T., Hirvensalo, M., Raitakari, O., & Tammelin, T. H. (2023). Parenthood and changes in physical activity from early adulthood to mid-life among Finnish adults. Scandinavian Journal of Medicine and Science in Sports, 33(5), 682-692. https://doi.org/10.1111/sms.14293

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Section III: Health, Disease & Physical Activity (Section Editor: Mark Hamer, UK)

Parenthood and changes in physical activity from early adulthood to mid-life among Finnish adults

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This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/sms.14293

ABSTRACT

This study examined longitudinal associations between parenthood-related factors and physical activity from young adulthood to midlife over a 19-year follow-up period. Participants (n=761) at the ongoing Cardiovascular Risk in Young Finns Study responded to a self-report questionnaire in their adulthood (in 1992, 2001, 2007 and 2011). Participants were classified as meeting or not meeting an aerobic physical activity recommendation. Parenthood related factors included the age of having their first child, as well as the number and age of the children. Analyses of Generalized Estimation Equations were performed and adjusted for several demographic and health-related covariates. Both mothers and fathers with children under six years were less likely to be involved in physical activity than participants without children. However, meeting the aerobic physical activity recommendations did not differ between parents with a youngest child who was six years old or older as compared to the childless participants. The older the youngest child was, the more likely the parents were to be physically active. Participants who became a parent relatively late, at the age of 30 or older, seemed less likely to meet the aerobic physical activity recommendation during follow-up than those who had their first child at the age of 26-29. The results indicate that parenthood does not seem to have a long-lasting negative impact on adults' physical activity, and the individuals reached a similar level of physical activity in midlife than they had before parenthood.

Keywords: physical activity, parenthood, family, adult, mother, father, child

Introduction

Considering the health benefits of regular physical activity,[1] it is crucial to understand when and why people take up or drop off physical activity, and how different life events are associated with changes in activity patterns. Becoming a parent is marked by many co-occurring psychological, social, economic, behavioural and biological changes.[2] Living with young children influences both mothers' and fathers' health behaviours, such as diet, sleeping, substance use, sedentary behaviour and physical activity, but in potentially different ways.[3] These changes during transition to parenthood can have a long-lasting impact on the shape of health trajectories into midlife.[4]

Understanding parental physical activity is vital, because parents' health behaviours have implications not only for themselves but also for their children's development and future health behaviours. Kaseva et al.[5] found that mothers' and fathers' physical activity contributes favourably and systematically to their offspring's physical activity from childhood to young adulthood in a 30-year longitudinal study based on this same cohort. Parental modeling can be an important predictor of child behaviour and physically active parents are more supportive of their children's physical activity than non-active parents.[6]

Reviews of physical activity and parenthood have concluded that becoming a parent is primarily associated negatively with adults' physical activity.[7,8] Recently, Corder et al.[9] found that the results of physical activity changes and parenthood were equivocal in four longitudinal studies but demonstrated, however, greater decreases in moderate to vigorous physical activity among parents compared to non-parents. A two-year longitudinal study conducted by Hull et al.[10] showed that

having a child reduced parents' physical activity levels about three hours per week compared to individuals who stayed childless.

Physical activity appears to decline particularly among mothers and first-time parents.[10] However, some results have also found that becoming a parent reduces physical activity for men even more than for women.[11] There are inconsistent findings regarding parents' sex, age and number of children as a predictor of parents' physical activity but many suggested that having younger children in the household related to decreased parental physical activity time.[7,12]

A considerable amount of cross-sectional research on physical activity and parenthood exists, but rather few of them are longitudinal studies.[7,9] In earlier studies, follow-up times have usually been shorter than 10 years, without analysis of parents' physical activity during midlife when their children have grown and become more independent.[10,13] Because of incongruities in earlier studies, there is a need for longitudinal and multivariate analyses of the impact of parenthood-related factors on adults' physical activity.[7]

The main purpose of our study was to describe and quantify the associations of parenthood-related factors with the probability of meeting the recommended level of aerobic physical activity from young adulthood to midlife. Specifically, we studied whether the different parenthood-related factors (i.e., the number of children, the age of the youngest children, the number of young children and the age of having one's first child) were associated with changes in physical activity level in men and women in a 19-year follow-up. Analyses were stratified by sex because earlier studies have shown that parenthood may have a different effect on the levels of physical activity of women and men.[8,11] To our knowledge, no study has examined the longitudinal associations of parenthood-related factors with physical activity by this long follow-up period to show how parental physical activity changes as the children age.

Materials and methods

Data

The data were from the Cardiovascular Risk in Young Finns Study that is an ongoing 40-year longitudinal study designed to examine cardiovascular disease risk factors and their determinants.[14] Participants were randomly selected from five Finnish cities (Helsinki, Kuopio, Oulu, Tampere and Turku) and their surrounding communities. Six birth cohorts of 3-18-year-old boys and girls (N=3596) were examined for the first time in 1980 and eight follow-up phases have been conducted since. Each participant or minor children's parents provided written informed consent before participating in the study. The ethics committees of the five Finnish universities have approved the research protocol of the Young Finns Study (Decision number 533/2006).

This study uses data from the follow-up studies conducted in 1992, 2001, 2007 and 2011. In 1992, participants were young adults 18–30 years of age and they approached midlife (ages 37–49 years) at the follow-up in 2011. A total of 761 individuals (433 women and 328 men), whose marital status was married or cohabiting in 2001, 2007 and 2011, and who had at least one child before 2007 were included in this study sample. All participants had physical activity data from at least three of four follow-up phases during adulthood with 581 participants (345 woman and 236 men) having completed physical activity data from all four study phases.

Measurements

Physical activity level during adulthood (outcome)

The outcome variable of this study was questionnaire-assessed leisure-time physical activity level during adulthood (in 1992, 2001, 2007 and 2011). Participants reported the frequency and duration (hours) of their moderate to vigorous physical activity in a typical week.[15] Participants were classified as meeting a recommended aerobic physical activity level if they engaged in moderate to vigorous physical activity or sport at least two to three times a week and their total physical activity time was at least 2-3 hours per week. The definition was modified from the recommendation for health-enhancing physical activity for adults aged 18-64 years.[16]

Parenthood variables (exposure)

In 2011 follow-up, participants reported their children's birth years. Those who had no children before 2007 were excluded from the study sample because the aim of the study was to analyse parents' physical activity longitudinally, also after their children growth and become more independent of their caregivers. The number of children, the age of the youngest child and number of young children (≤ 5 y) were calculated based on this question at each year of follow-up. The age of having the first child was calculated as a difference between birth year of the first child and participant's year of birth and categorised into three groups (≤ 25 y, 26-29 y, ≥ 30 y) based on sample distribution so that every group represents roughly a third of each sample. All categorisations of parenthood variables are shown in table 1.

The parenthood variables were chosen based on previous studies, which have shown mixed findings with regard to age and number of children as a predictor of parental physical activity.[7,9] The timing of parenthood, i.e., the parent's own age of having the first child may also influence the degree to which parenthood affects physical activity. It has been denoted that relatively early or late parenthood in the life course may accelerate weight gain in both women and men.[4]

Demographics and health-related variables (covariates)

Birth cohort, age (years), education level, employment status, living area, weight status, status of chronic diseases and youth physical activity level were applied as covariates. Covariates were selected based on data availability and previous studies examining the correlates of adulthood physical activity.[17,18] The data was self-reported except weight status, which was measured during the clinical visit of each follow-up study.

Participants' education level was assessed using their highest qualification and it was at first categorised into three groups: low (comprehensive school), middle (high school or vocational school) and high (academic-level education). For the analyses, low and middle education groups were combined because there were few participants (3-11%) with low education in follow-up phases.

Employment status was classified at first into four categories: employed, student, stay-at-home mother/father and unemployed or disability pension. Because the last three groups have relatively

few individuals throughout follow-up years, these were combined for the analyses (employed vs. other). Participants' living area was assessed via a 3-category scale: urban, sub-urban and rural.

Participants' height and weight were measured in clinical examinations and body mass index (BMI) was calculated (kg/m^2). BMI measurements were missing from 22 percent of participants (n=167). Absence of BMI was addressed by multiple imputation.[19] Weight status was determined based on BMI and WHO's classification: normal weight (BMI 18.5-24.9), overweight (BMI 25.0-29.9) and obesity (BMI ≥ 30). One percent of participants (n=9) had BMI 16.9-18.4 (underweight) and they were combined into a normal weight group. Participants were asked to report their chronic diseases or disabilities in follow-up phases and the dichotomous variable: having a chronic disease or not was created from these data.

Participants' physical activity level in youth was assessed before they had any children at the age of 15 or 18, depending on data availability. For youth physical activity, we used a sum index of physical activity (PAI 1980-1989) that was computed based on five variables concerning the frequency and intensity of leisure-time physical activity, participation in sport-club training and sport competitions and habitual ways of spending leisure time.[15] Participants' youth physical activity level was categorised as low, middle or high, based on which thirds of the sum index they fell into. The original questions relating to the physical activity variables and their re-coding and indicators of reliability and validity are presented elsewhere.[15] Studies have suggested that the stability of physical activity is moderate or high from youth to adulthood.[20]

Statistical analyses

At first, we analysed descriptive statistics of the sample. After that we studied the question of how parenthood associates with participants' physical activity over time. For these analyses, participants were divided into three groups according to timing of their first childbirth and regarding the follow-up phases of this study: 1) becoming a parent before 1992, 2) becoming a parent between 1992 and 2000 and 3) becoming a parent between 2001 and 2006. Differences between groups were tested by a Chi Square-test and the differences between years test of multiple proportions. The sample of 581 participants, who had complete physical activity data from adulthood, was used in these analyses, because tests (named above) did not deal efficiently missing cases and changes in the sample.

Next, we studied the effects of the parenthood-related factors on the physical activity, adjusted for potential covariates. We included the observations of all four follow-ups into a unified, longitudinal data set. The covariate information was available for 2,567 measurements of 704 subjects (400 females, 304 males). The multiple observations of an individual across study occasions are not independent. To correctly address the structural dependency of the data, we exploited the Generalized Estimation Equations (GEE) approach.[21] GEE is a suggested method of the case of logistic regression as it provides more reliable effect measures.[22] We used an R package, geepack, in which the parameters of GEE models are solved by maximising quasi-likelihoods given vague assumptions of the covariance structure of the data.[23]

The analyses were conducted separately for women and men to study whether parenthood has different associations with physical activity among mothers and fathers. We began by estimating the effects of demographical and health covariates on the meeting of the recommended aerobic

physical activity levels (Appendix 1). Next, we added the parenthood variables (exposure factors) one by one to the GEE framework and inspected statistically significant additions ($p < 0.05$ in the Wald's ANOVA statistic) to the models 1-4 (Table 2). The impacts of parenthood variables on the goodness of fit were measured by Tjur's Coefficient of Discrimination.[24]

To exemplify the interpretation of our key results, we calculated the predictive log-odds based on GEE parameters and further transformed (inverse logit) the predictions into the probability scale. We analysed the predictive probabilities to achieve recommended levels of physical activity via different levels of exposure to the age of the youngest child (Table 2: Model 2b, parents only). To this end, levels of covariates were fixed to represent a 'typical case' as follows: age of 40 years, middle or low education, employed, living in a suburban area, normal weight, no chronic disease or disability and moderate level of youth physical activity.

Results

Sample characteristics. Descriptive characteristics of the participants are shown in Table 1. The education level of participants was primarily middle or high, and the proportion of highly educated individuals increased during follow-up. Most of the participants lived in suburban areas. Men were more frequently employed than women in every follow-up phase, although women's employment rate increased throughout follow-up. Women more frequently had normal weight status than men, but the prevalence of overweight and obesity status increased in both sexes during the follow-up. Women reported more chronic diseases or disabilities compared to men. The prevalence of chronic diseases or disabilities increased during follow-up in both sexes.

In the first phase in 1992, over 70 percent of participants did not yet have children. The most common number of children was one or two (61.5%) in the last follow-up phase. Prevalence of young children (when the age of the youngest child was less than six years) was highest in 2001. For the parenthood variables, a significant sex difference was observed in age when women and men become parents. Women were younger than men when they experienced first childbirth.

All participants' physical activity level was significantly higher in 2011 than in earlier follow-up phases (in 1992, 2001 or 2007**). In 2007, women (44.4%) had a significantly higher physical activity level than men (33.8%).

Potential sampling bias. We analysed the potential sampling bias by comparing the eligible sample to the corresponding cohorts of Young Finns Study participants who did not fulfil the inclusion criteria. In the first follow-up phase (1992), participants in this study were about one year older ($p<0.01$), had more frequently high or middle education ($p<0.01$) and were more frequently employed ($p<0.01$) than non-participants. At the end of the study period (2011), no differences were observed for education level, but men in the present sample were more frequently employed ($p<0.01$) than men among non-participants. In 2011, participants in our sample lived less frequently in urban areas (women $p<0.05$; men $p<0.01$) when compared to non-participants. The women in our sample had a higher physical activity level during youth ($p<0.05$) than women among non-participants, but no significant differences were observed between groups in adulthood physical activity in 1992 or 2011. The men in our sample met aerobic physical activity recommendations less

frequently ($p<0.05$) in 1992 than non-participants, but in 2011, no significant differences were found.

Physical activity time trends from 1992 to 2011 in groups by different timing of first child. Figure 1 shows the proportions of participants (n=581) who met the recommended aerobic physical activity level from 1992 to 2011 in groups with different timing of the first child (Groups 1, 2 and 3). All groups had their lowest physical activity level in the follow-up phase that was closest/next after the birth of their first child. However, the decline of physical activity after becoming a parent seems to be temporal and proportions of participants who met recommended aerobic physical activity levels increased in the later years of parenthood. For example, those who become a parent before 1992 (Group 1) had a significantly higher physical activity level in 2007 and 2011 compared to the year 1992 (1992<2007*, 1992<2011**). Similarly, Group 2 had a significantly higher physical activity level in 2011 than in 2007 or 2001 (2001<2011**, 2007<2011**) and Group 3 had a higher physical activity level in 2011 than in 2007 (2007<2011*). Participants of Groups 2 and 3 reached similar physical activity levels in 2011 than they had before parenthood (e.g., the differences between the years 1992 and 2011 were non-significant).

Parenthood models. Table 2 shows covariate adjusted models of associations between adult participants' physical activity and parenthood variables included one by one. Associations of covariates with adult PA are reported in detail in Appendix 1.

Women and men who had at least one child were less likely to meet the physical activity recommendations during follow-ups than participants who did not have children (Women with 1-2 children: OR= 0.38 95% CI: 0.26-0.56; Men with 1-2 children: OR=0.32 95% CI: 0.21-0.51). However, quite similar probability was found amongst those who had 1-2 children and those who had 3 or more children, suggesting that parenthood itself was the key factor, not the number of children (Table 2: Model 1).

The age of the youngest child was associated with physical activity levels in both women and men (Table 2: Model 2a). Participants who had a young child, e.g., 0-2-year-old (Women OR: 0.35, 95% CI: 0.22-0.54; Men OR: 0.37 95% CI: 0.22-0.60) or a 3-5-year-old child (Women OR: 0.62, 95% CL: 0.40-0.96; Men OR: 0.38 95% CI: 0.23-0.63) were found to be less likely to meet aerobic physical activity recommendations than participants without children. Conversely, women and men whose youngest child was six years old or older were found to meet the recommended physical activity level as likely as non-parents.

Model 2b includes only participants who had at least one child and the reference group was parents with at least one 0-2-year-old child. Women with a child over two years old (OR: 1.83, 95% CI: 1.23-2.70) and men with children over five years old (OR: 1.69, 95% CI: 1.09-2.63) had nearly twofold odds for meeting aerobic physical activity recommendations than parents whose youngest child was aged 0-2 years. Increasing odds ratios showed that the older the youngest child was, the more likely their parents were to be physically active. To demonstrate this result, we computed the predictive probabilities to achieve recommended physical activity by fixed covariates and different levels of exposure to the age of the youngest child. In women, the predictive probability of achieving the recommended level of physical activity was 31.6% when the age of the youngest child was 0-2 years. The probability increased to 45.8% (3-5 y) and 51.7% (6-17 y) when the youngest child aged. Correspondingly, in men, the predictive probability values were 46.6% (0-2 y), 46.2% (3-5 y) and

59.6% (6-17 y). This suggests that very young children (0-2 y) decreased mothers' activity more than fathers' physical activity, but otherwise associations were quite similar in both sexes.

In model 3, we compared to participants who reported that they had at least two young children (≤5y) with the participants who had fewer than two young children. No associations were observed, even the hypothesis was that caring for many young children could be a barrier to parents' physical activity.

The first childbirth at any age during adulthood was associated with lower physical activity level than not having children at all (Model 4a). In addition, significant odds ratios were observed when compared to parents who had their first child at age of 26-29 years and parents who had their first child at the age of thirty or later (Model 4b). Those who became first-time parents at the age of 30 or later were less likely to meet the physical activity recommendations during follow-ups (Women OR: 0.62 95% CI: 0.42-0.91; Men OR: 0.61, 95% CI: 0.39-0.95).

Discussion

The study showed that becoming a first-time parent decreased physical activity of both mothers and fathers. Participants with children younger than six years of age were significantly less likely to meet aerobic physical activity recommendations compared to non-parents. However, the association was not observed with participants whose youngest child was six years old or older, indicating that parenthood does not have a long-lasting impact on parents´ decreased physical activity in mid-life. In addition, our results did not show that parents with multiple children or many young children have a greater risk for low physical activity than other parents.

Our findings are consistent with Adamo et al.[25], who analysed cross-sectional accelerometer data and noticed that parents with children younger than six years of age were less likely to meet physical activity guidelines. Moreover, our results add the knowledge about longitudinal associations of parenthood and physical activity, and especially show the recovery of parents' physical activity level when their children age. Based on relatively short, two to four-year follow-up periods, earlier researchers have concluded that parents who experience decreases in physical activity as a result of having a child do not appear to rebound to their pre-child physical activity level.[10] Over seven-year follow-up by Sallis et al.[26] found an increased physical activity trend among American mothers, which is somewhat consistent with our findings. However, a change in the number of young children (aged 0-4 years) was unrelated to the change in physical activity, even if they assumed that younger children may interfere with mothers' physical activity more than older children.[26]

To our knowledge, previous research has not examined how parents' age of having the first child may impact their level of physical activity. We found that participants who became a first-time parent relatively late (≥ 30 y) seemed to be less likely to meet an aerobic physical activity recommendation than participants who had their first child at 26-29 years of age. In the current study, it is not possible to offer data-based reasons for this finding. Earlier studies have noticed that late parenthood could associate both disadvantages and advantages for the wellbeing of parents and children.[27] However, studies assessing the timing of parenthood and its associations with health behaviours such as physical activity are rare. Childbearing has been moving quickly toward higher ages in developed countries and further research is needed to fully understand its social, economic, biological and health consequences.[27]

Earlier studies have suggested that the impact of parenthood on physical activity differ for men and women.[10,11,28,29] Our results for Finland's population showed that becoming a parent contributed

unfavorably to physical activity level in both women and men. However, predictive probability values indicated that very young children (0-2y) seemed to affect mothers' physical activity more, which is consistent with previous studies.[7,29]

In Finland, the differences between adult women's and men's physical activity levels are relatively narrow: 50% of the men and 49% of women (≥30 years) reported in a FinHealth 2017 study that they reached the aerobic physical activity guidelines, which suggest at least 150 minutes per week of moderate-intensity aerobic physical activity or 75 minutes a week of vigorous intense physical activity.[30] In our data, only one significant difference between sexes was noticed in 2007, when more women (44.4%) than men (33.8%) met the aerobic physical activity recommendation. The similarity between Finnish women's and men's physical activity levels can have some effect on the results of the present study.

Although parenthood seems to decrease both mothers' and fathers' physical activity, barriers and possibilities to participate in leisure-time physical activity differ between women and men due to the varied roles and responsibilities within families. Finnish women do, on average, one hour per day more domestic work (e.g., cooking, cleaning, shopping and childcare) than men, even though the differences between the time that women and men spend on household chores has slightly decreased in the 21st century.[31] On the other hand, men have longer working weeks.[31] Traditionally and currently, young children are primarily taken care of by their mothers, even though several reforms of parental leave have been made since the 1970s in Finland to promote equality between the sexes and diverse families.[32] This can sustain unequal possibilities for women and men to take part in the family life and labor market. Our data showed that the employment rate for women was significantly lower than for men in every follow-up phase, even if it increased over the course of the years of the study.

The above suggests that childcare and household chores may reduce the time available for leisure-time physical activity more for women than men, but men may experience more lack of time due to job responsibilities. In their review, Bellows-Riecken and Rhodes[7] concluded that the most commonly reported barriers to physical activity among parents were lack of time and social support, fatigue, childcare and responsibilities to other roles. Many parents value the health benefits of physical activity and they want to be good role models for their children, but family and occupational responsibilities and scheduling constraints may make it difficult to prioritise physical activity.[33] Parents may also consciously modify their priorities from self to child and experience that their own sport and exercise is no longer as important as it was before parenthood.[34]

On the other hand, it is suggested that maternity or childcare leave may increase opportunities for such activities that involve childcare, like walking with a buggy or co-participation in physically active play with children.[11] Device-based measurements of physical activity have shown that mothers and fathers with young children engaged in less moderate to vigorous physical activity but more light intensity activity than non-parents.[28] Some studies have also suggested that parents may have less sedentary time than non-parents.[29] Though parents may spend time in light physical activity, some health benefits increase with the intensity of physical activity[35] and parents should be encouraged to engage in moderate to vigorous physical activity as well.

The strength of this study includes the longitudinal design with a nearly 20-year follow-up period, and the sample that allowed the examination of the role of both motherhood and fatherhood on physical activity across family development. There have only been a few longitudinal cohort studies

to address impact of parenthood on chance in physical activity and to our knowledge these questions have not previously studied in a Finnish or other Nordic population.

The rich data set also allowed multiple covariates to be considered within the analysis. However, there may be unmeasured potential covariates or mediators that we were not able to include in the analysis, such as partner and peer support, working hours, job stress, sleep and psychological resources like perceived competence in parenthood or in sport and physical activities. Besides parenthood, there are also other life events common in young adulthood that can have an independent or interactional effect on parents' physical activity and it is possible that the timing of life events is also an important factor.[9] For example, Miller et al.[36] imply that having two significant life events like marriage and childbirth a short time frame may combine to decrease physical activity.

We analysed self-reported measures of physical activity in leisure time and acknowledge that questionnaires are sensitive to reporting bias that can lead to over- or underestimation of physical activity. However, previous study on validity of physical activity questionnaire showed that our questions describing the frequency and hours of moderate to vigorous physical activity, correlates moderately ($r = 0.28 – 0.44$) with the pedometer-measured step counts of adult woman and men.[37] The same questions of physical activity were used during follow-up 1992–2011, assuming that the potential bias would be the same at four measurement points and did not affect the changes of physical activity any differently. Recent follow-ups of the Young Finns Study have included device-measured physical activity data, but for this long follow-up period with the first measurement point in 1992, only questionnaire data was available. Further studies using device-based measurements of parental physical activity in longitudinal settings would be helpful to understand changes in different physical activity levels, including light physical activity and sedentary time.

The exact information about the number or age of children living in the participant's household during follow-up years was not available in the data of the Young Finns. When the study sample was composed, we used the criterion of married or cohabiting (in 2001, 2007 and 2011), because we assumed that cohabiting participants are more likely to live with their children. In any case, it is possible that some participants have divorced and found a new partner between follow-up years, and some may have a blended family, and hence, the living arrangements of their children can vary.

Our follow-up data was collected between 1992 and 2011, because we selected cohorts so that Young Finns Study participants were most likely to become parents during measurement years and followed them until middle age to get the most relevant data to analyse our research questions. It is likely that cultural changes in society over time have some effects on parenthood and adult physical activity. For example, the increased educational level of the population and big steps in information and communications technology could affect these matters in such a way that parents are nowadays more aware of the health effects of physical activity than they were in the 1990s. Nevertheless, our data is primarily from the 2000s, with the last follow-up point having been in 2011, and we expect that the effect of cultural changes on the associations of interest is minimal.

Perspectives

Although becoming a parent has primarily associated negatively with adults' physical activity in earlier studies, little is known about parents' longitudinal physical activity changes when their children age. In this study, we used 19 years of longitudinal data with four follow-up measurements to study associations between parenthood-related factors and physical activity from young adulthood to midlife among Finnish adults. Our study showed that becoming a parent was associated with decreased likelihood to meet aerobic physical activity recommendations among both mothers and fathers. However, parenthood did not have long-lasting impact on parents´ decreased physical activity, and individuals reached a similar level of physical activity in midlife than they had before

parenthood. Our study may suggest that parents with young children would need more support to maintain and enhance their physical activity, because the physical activity levels of parents with under 6-year-old children were the lowest. Regular physical activity may support parents' physical health but also increase psychological resources and help with coping with parental stress, which could also promote quality of family life and the well-being of children. More studies are needed to better understand the factors that enhance the physical activity of parents with children of different ages.

Acknowledgements (Funding statement)

This study was financially supported by the Finnish Ministry of Education and Culture: grant 321963. The Young Finns Study has been financially supported by the Academy of Finland: grants 322098, 286284, 134309 (Eye), 126925, 121584, 124282, 255381, 256474, 283115, 319060, 320297, 314389, 338395, 330809, and 104821, 129378 (Salve), 117797 (Gendi), and 141071 (Skidi); the Social Insurance Institution of Finland; Competitive State Research Financing of the Expert Responsibility area of Kuopio, Tampere and Turku University Hospitals (grant X51001); the Juho Vainio Foundation; the Paavo Nurmi Foundation; the Finnish Foundation for Cardiovascular Research; the Finnish Cultural Foundation; the Sigrid Juselius Foundation; the Tampere Tuberculosis Foundation; the Emil Aaltonen Foundation; the Yrjö Jahnsson Foundation; the Signe and Ane Gyllenberg Foundation; the Diabetes Research Foundation of the Finnish Diabetes Association; EU Horizon 2020 (grant 755320 for TAXINOMISIS and grant 848146 for Aition); European Research Council (grant 742927 for the MULTIEPIGEN project); the Tampere University Hospital Supporting Foundation, the Finnish Society of Clinical Chemistry and Cancer Foundation Finland.

Conflict of interest

The authors declare no conflict of interest.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics approval statement

Individuals or minor children's parents provided written informed consent before participating in the study. The ethics committees of the five Finnish universities have approved the research protocol of the Young Finns Study (Decision number 533/2006).

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Table and figure legends

Table 1. Descriptive statistics of the sample (433 women and 328 men).

Table 2. Associations of parenthood variables with adult participants' longitudinal physical activity. Odds ratios (OR) and 95% confidence intervals (CI) for meeting the recommended aerobic physical activity level.

Figure 1. The proportions of participants who met the recommended aerobic physical activity level in groups (Group 1-3) by different timing of having their first child.

Table 1. Descriptive statistics of the sample (433 women and 328 men).[1)]

	1992		2001		2007		2011	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**
Demographics and health-related variables (covariates)								
Age, years (mean)		ns		ns		ns		ns
	24.5	24.9	33.5	33.9	39.5	39.9	43.5	43.9
Education level (%)		ns		ns		ns		ns
High	14.4	12.0	28.1	23.6	34.4	30.3	38.9	35.4
Middle	76.7	74.9	65.3	67.1	61.7	63.7	59.2	60.9
Low	8.9	13.1	6.6	9.4	3.9	6.0	1.9	3.7
Employment (%)		**		**		**		*
Employed	40.9	55.7	66.8	92.7	75.8	91.7	82.4	88.0
Student	33.1	26.0	3.3	1.8	3.7	0.6	1.9	0.3
Stay-at-home parent	10.4	0.0	18.9	0.3	9.2	0.6	3.5	0.6
Unemployed or other	15.7	18.3	11.0	5.2	11.3	7.0	12.3	11.1
Living area (%)		ns		ns		ns		ns
Urban	14.3	13.6	11.8	9.3	8.2	6.4	8.1	9.8
Suburban	70.5	69.4	66.8	70.5	68.5	70.3	66.2	66.9
Rural	15.2	16.9	21.3	20.2	23.3	23.2	25.6	23.3
Weight status (%)		*		**		**		**
Normal weight	78.1	65.1	63.9	44.2	51.5	33.0	46.3	32.6
Overweight	16.4	32.5	24.6	42.6	30.0	46.6	32.6	46.2
Obesity	5.5	2.4	11.5	13.2	18.4	20.4	21.2	21.2
Chronic disease or disability (%)		*		**		**		**
At least one disease	16.4	10.4	28.6	18.0	34.2	27.7	42.7	30.8
Youth leisure-time physical activity at the age of 15-18 y (%) (in 1980-1989)		ns						
	31.6	29.5						
Low	43.0	38.3						
Middle	25.4	32.1						
High								
Parenthood variables (exposure)								
Number of children (%)		ns		ns		ns		ns
0	71.6	75.3	17.6	21.0	0.0	0.0	0.0	0.0
1-2	25.6	22.6	62.4	58.5	65.8	65.9	61.4	61.6
≥3	2.8	2.1	20.1	20.4	34.2	34.1	38.6	38.4
Age of the youngest child (%)		ns		ns		ns		ns
No children	71.6	75.3	17.6	21.0	0.0	0.0	0.0	0.0
0-2 y	20.1	17.1	28.2	29.0	15.7	19.8	4.6	3.7
3-5 y	6.9	7.3	26.1	26.5	21.7	24.1	11.8	13.1
6-17 y	1.4	0.3	28.2	23.5	58.7	54.6	70.0	71.3
≥ 18 y	0.0	0.0	0.0	0.0	3.9	1.5	13.6	11.9
Many young children (%)		ns		ns		ns		ns
At least two under 5-year-old children	9.7	9.8	15.5	16.5	10.6	12.2	4.2	3.7
Age during the first birth		**						
≤ 25 y	34.6	23.5						
26 – 29 y	33.9	38.1						
≥ 30 y	31.4	38.4						
Physical activity (outcome)								

Met aerobic physical activity		ns		ns		*		ns
recommendations (%)	41.6	37.1	39.0	33.7	40.4	33.8	54.8	49.4

1) Differences between sex are flagged with ns (non-significant), *($p < 0.05$) or ** ($p < 0.01$).

Table 2. Associations of parenthood variables with adult participants' longitudinal physical activity. Odds ratios (OR) and 95% confidence intervals (CI) for meeting the recommended aerobic physical activity level.[1)]

		Woman (n=400) **OR (95% CI)**	**Men** (n=304) **OR (95% CI)**
Model 1		R2: 0.090	R2: 0.084
Number of children	None	Reference	Reference
	1-2	**0.38 (0.26-0.56)**	**0.32 (0.21-0.51)**
	≥3	**0.33 (0.20-0.54)**	**0.31 (0.18-0.55)**
Model 2a		R2: 0.103	R2: 0.095
Age of the youngest child	None	Reference	Reference
	0-2 y	**0.35 (0.22-0.54)**	**0.37 (0.22-0.60)**
	3-5 y	**0.62 (0.40-0.96)**	**0.38 (0.23-0.63)**
	6-17 y	0.79 (0.49-1.29)	0.65 (0.36-1.20)
	≥18 y	1.62 (0.75-3.52)	1.11 (0.42-2.93)
Model 2b (only parents)		R2: 0.093	R2: 0.103
Age of the youngest child	0-2 y	Reference	Reference
	3-5 y	**1.83 (1.23-2.70)**	0.98 (0.64-1.52)
	6-17 y	**2.31 (1.55-3.45)**	**1.69 (1.09-2.63)**
	≥ 18y	**4.66 (2.30-9.44)**	**2.62 (1.13-6.04)**
Model 3 (only parents)		R2: 0.077	R2: 0.092
Two young children (≤5y)	No	Reference	Reference
	Yes	0.85 (0.56-1.31)	0.82 (0.52-1.30)
Model 4a		R2: 0.093	R2: 0.088
Age during the first birth	No child	Reference	Reference
	≤25 y	**0.40 (0.26-0.61)**	**0.33 (0.19-0.60)**
	26-29 y	**0.45 (0.29-0.70)**	**0.37 (0.23-0.61)**
	≥30 y	**0.27 (0.17-0.44)**	**0.27 (0.16-0.45)**
Model 4b (only parents)		R2: 0.083	R2: 0.101
Age during the first birth	26-29 y	Reference	Reference
	≤25 y	0.88 (0.62-1.25)	0.79 (0.49-1.29)
	≥30 y	**0.62 (0.42-0.91)**	**0.61 (0.39-0.95)**

1) Analyses adjusted by covariates (birth cohort, age (years), education level, employment status, area of residence, weight status, status of chronic diseases and youth physical activity level) and stratified by sex.

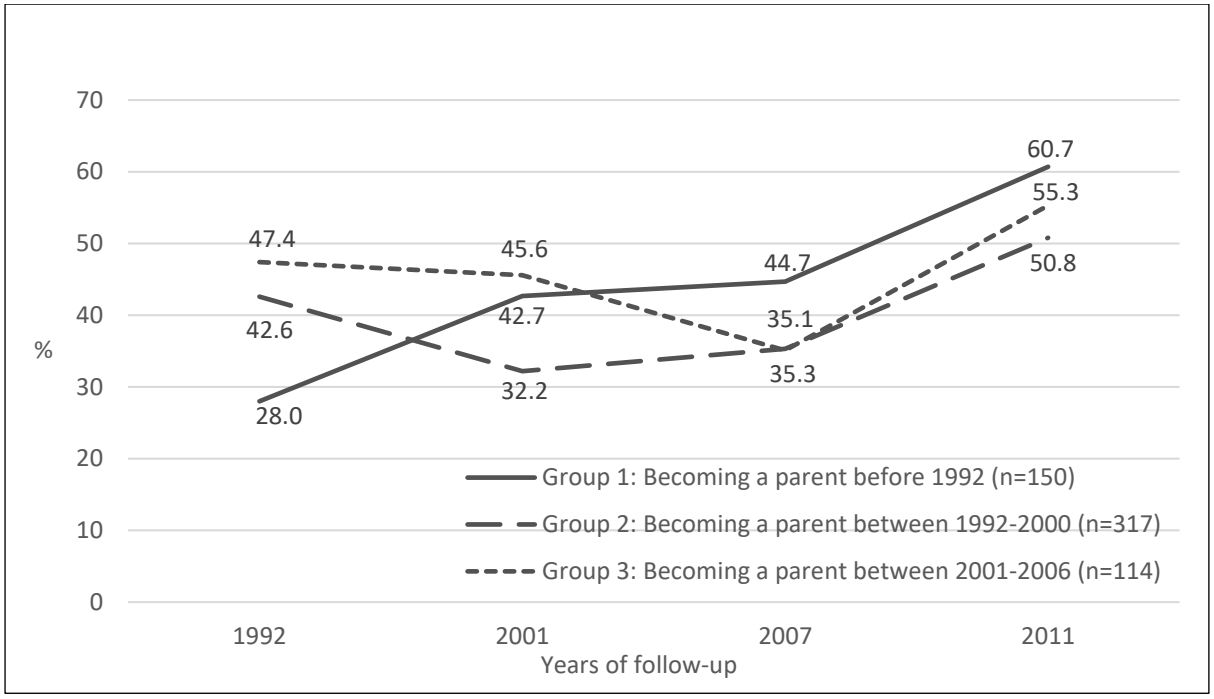

Figure 1. The proportions of participants who met the recommended aerobic physical activity level in groups (Group 1-3) by different timing of having their first child.