



Original Research

Parous women perform less moderate to vigorous physical activity than their nulliparous peers: a population-based study in Denmark

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ABSTRACT

Objectives: The World Health Organization (WHO) highlights parous women as a key population for monitoring trends of physical activity (PA). We aimed to estimate the proportion of Danish women non-adhering to WHO PA guidelines in parous women compared with nulliparous women and to describe leisure-time PA intensity in each of these groups.

Study design: Cross-sectional study.

Methods: This population-based study builds on a sample of 27,668 women aged 16–40 years from the Danish National Health Survey 2021. These data were linked with childbirth data from the Danish National Birth Registry. The primary outcome was self-reported weekly hours of moderate to vigorous leisure-time PA (MVPA) dichotomized into: (i) adhering to WHO guidelines for MVPA or (ii) not adhering to WHO guidelines for MVPA. Binomial regression analysis was used to calculate prevalence proportions (PP) and prevalence proportion ratios (PPR).

Results: Of the 27,668 women, a total of 20,022 were included; 9338 (46.6%) parous women and 10,684 (53.4%) nulliparous women. The PP of women non-adhering to WHO PA guidelines was 63.8% (95% CI 62.9–64.8) for parous and 51.3% (95% CI 50.4–52.3) for nulliparous women, corresponding to a PPR of 1.24 (95% CI 1.21; 1.27).

Conclusions: The proportion of parous women who did not adhere to WHO PA guidelines for MVPA was 24% higher than that of nulliparous women. This highlights parous women as a subgroup of the adult population at increased risk of non-adherence to WHO PA guidelines. These findings call for future research to inform new strategies aiming to promote PA in parous women.

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Introduction

Physical activity (PA) has been suggested to have health benefits across various populations.¹ Accordingly, the World Health Organization (WHO) has encouraged all nations to integrate national PA guidelines into their policy frameworks for public health action.¹ The WHO recommends a minimum of 150 min of moderate-

intensity PA (MPA) per week, 75 min of vigorous-intensity PA (VPA) per week, or an equivalent combination of moderate- and vigorous-intensity PA (MVPA) per week for adults aged 18–64 years.²

Furthermore, the WHO recommends that all nations establish population monitoring systems for tracking trends in PA across diverse demographic segments and subpopulations.¹ In 2021, women who have given birth (parous women) were, for the first time, highlighted as a key subpopulation to monitor.¹ Major life changes, like the transition from being childless (nulliparous) to becoming a mother, may influence lifestyle habits, including PA.^{3,4} The transition to motherhood could be a potentially decisive

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‘teachable moment’ to promote healthy PA behavior for two main reasons. First, new mothers often display a heightened motivation to alter their lifestyle behavior, such as enhancing PA habits, as it could benefit not only their own health but also the health of their children.^{5,6} Second, during this period, women have frequent contact with healthcare providers; this may establish several opportunities for guidance and support, which is known to be a critical factor in promoting healthy behaviors like PA.^{6–9}

PA may support several health parameters in pregnant and postpartum women.^{1,10} In the short term, PA engagement has been linked to a reduced risk of postpartum depression and improved emotional well-being.^{11–15} Additionally, PA engagement has been associated with a reduced risk of pregnancy-related weight gain retention.^{1,16,17} In the long term, PA brings benefits for the expectant mothers and their offspring. For example, recent evidence suggests that physically active mothers tend to have children who are also physically active.¹⁸ This finding aligns with a substantial body of literature demonstrating a positive association between the PA of parous women and the PA levels of their children.^{13,19–22}

Despite the health benefits, the general population and specifically women do not adhere to the WHO PA guidelines. According to Guthold et al., 27% of the worldwide adult population did not adhere to the WHO PA guidelines.²³ The highest proportion of non-adherence was found in women in high-income Western countries (42.3%, 95% CI 39.1–45.4).²³ In Denmark, the most recent national population-based survey indicated that 61% of women aged 16 years and above did not adhere to the WHO PA guidelines.²⁴ Parous women constitute a substantial and distinct subgroup of the population. In Denmark, approximately 60,000 women embark on the transformative journey of motherhood each year.²⁵ Emerging research shows that this group of women is at increased risk of being insufficiently physically active.^{26–33} By exploring PA adherence among parous women, we may be able to identify a large subgroup that is particularly receptive to PA healthcare interventions. However, so far, no studies have examined the level of PA among parous women in Denmark, nor have any studies compared the PA level to their nulliparous peers.

We aimed to estimate the proportion of Danish women non-adhering to the WHO PA guidelines for MVPA among parous

women compared with nulliparous women, and to investigate the proportion of parous and nulliparous women reporting sedentary behavior or PA at light, moderate, or vigorous intensity levels during their leisure time.

Based on data from the Danish National health Survey 2021 and existing literature,^{26,33} we hypothesized that 64% of Danish parous women do not adhere to the WHO PA guidelines for MVPA, whereas the corresponding proportion for Danish nulliparous women (reference group) would be 58% when measured as self-reported PA. This corresponds to a prevalence proportion (PP) ratio of 1.1, which may signify a 10% higher proportion of women not adhering to the guidelines in parous women compared with nulliparous women.

Methods

Study population

The study population originated from the Danish National Health Survey (DNHS).²⁴ This national survey is conducted every 4 years as part of public health surveillance, with a view to systematically collect data on physical and mental health, health-related behavior, and morbidity in the adult Danish population aged 16 and above.³⁴ The present study was based on data collected in 2021. The design and methodology of the DNHS 2021 has been described elsewhere.^{24,35} In short, the DNHS 2021 was conducted between February 5 to May 12, 2021. The DNHS population was drawn as a representative sample from the Danish Civil Registration System.³⁶ The questionnaire was distributed to 324,000 Danes, of which 183,656 responded (56.7%). Of the invited population, 55,678 were women aged 16–40 years, of which 27,668 responded to the questionnaire (49.7%) (Fig. 1). Due to General Data Protection Regulation (GDPR) restrictions regarding microdata in women aged 16–19 years, women under the age of 20 were excluded from the exposure group. Consequently, the present study population was Danish women aged 20–40 years who had previously given birth to at least one live singleton child before completing the DNHS in 2021. The reference group consisted of Danish nulliparous women aged 20–40 years, who had completed the DNHS in 2021.

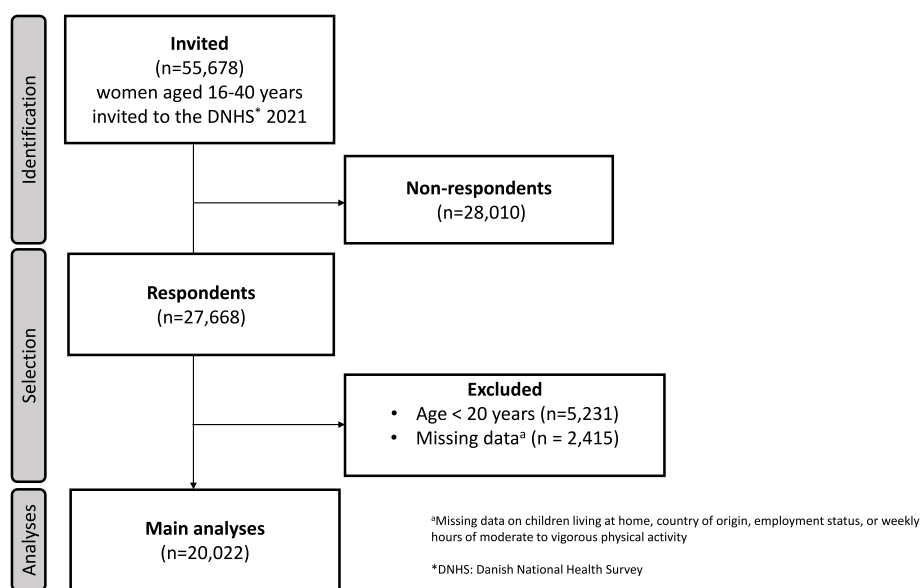


Fig. 1. Flowchart of sampling process.

Demographic covariates

The DNHS 2021 data were linked to national administrative registries through the unique personal identification number, which is assigned to all Danish citizens and registered in the Danish Civil Registration System.³⁶ Demographic registry data were drawn from annually updated information provided by Statistics Denmark. The demographic covariates included age, cohabitation status, living with or without children, educational level, country of origin, income, urbanization, and employment status.

Age was determined from the civil personal registration (CPR) number when completing the DNHS 2021 survey and categorised into four specific groups: 20–25, 26–30, 31–35, and 36–40. Educational level was reported as the highest attained education. Cohabitation status was reported as living alone or living with someone based on civil status and family type. Singles were categorised as living alone, whereas married and cohabiting women were categorised as living with someone.

Exposure: childbirths

Data on childbirths were obtained from the Danish Medical Birth Register (MBR),³⁷ which is maintained by the Danish Health Data Authority. The MBR contains comprehensive medical and civil registration information, which is systematically collected for all births in Denmark. The register assigns a unique CPR number to each newborn, which, in the present study, was linked to the mother's CPR number. This linkage enabled us to divide the main exposure variable into two groups: (i) parous women and (ii) nulliparous women. The systematic nature of Danish registries ensured a highly valid method for obtaining childbirth data.³⁸ Previous childbirths were categorised into five parity groups: 1, 2, 3, 4, and 5 or more. This categorisation was based on the parity status registered for the most recent childbirth for each parous woman prior to participation in the DNHS 2021.

Outcome: physical activity

The primary outcome of the present study was self-reported leisure time PA reported as weekly hours of MVPA, based on the DNHS 2021. Further information on adherence criteria to the WHO PA guidelines for MVPA is provided in [Table S1, Appendix](#). The respondents were asked to report their engagement in leisure-time PA by answering the following questions: 'In a typical week, how much time do you spend on moderate and strenuous PA, in which you become short of breath?' and 'How much of the time, stated in the previous question, do you spend on strenuous PA, in which you become so short of breath that it is difficult to speak?' Responses were divided into five categories for both MVPA and VPA based on the WHO PA guidelines. For MVPA, the categories were as follows: 1) less than 30 min per week, 2) 30–89 min per week, 3) 90–149 min per week, 4) 150–299 min per week, and 5) 300 min per week or more. For VPA, the categories were 1) less than 30 min per week, 2) 30–59 min per week, 3) 60–89 min per week, 4) 90–149 min per week, and 5) 150 min per week or more. Weekly hours of moderate and vigorous PA were combined into one variable (MVPA) and dichotomized into 1) those adhering to the WHO PA guidelines regarding MVPA and 2) those not adhering ([Table 3, Appendix](#)). The validity and reliability of the questions assessing PA in the DNHS has been described previously.³⁹

The secondary outcome of the present study involved self-reported leisure-time PA, which was categorised into four intensity groups based on the Saltin and Grimby questionnaire from 1968.⁴⁰ The questionnaire and its validation have been reviewed in a study by Grimby et al. in 2015.⁴¹ The respondents were asked to

categorise their leisure-time PA into one of four intensity groups by the following question: 'During the past year, which of the following, do you think describes your leisure-time PA the best?' The response options were (i) 'exercise strenuously and participates in competitive sports regularly and several times a week,' (ii) 'engages in leisure time sport and/or exercise or does heavy gardening or similar at least 4 h a week,' (iii) 'walking, biking or other kinds of light physical activity at least 4 times a week (include also brisk walks, light gardening and biking/walking to and from work),' and (iv) 'reading, watching television, or other sedentary behavior.'

Missing data

A total of 2415 women were excluded due to missing data ([Fig. 1](#)). Missing data were either due to missing responses on the primary outcome or data of the covariates. After exclusion, a total of 20,022 Danish women aged 20–40 years were included in analyses, representing the population of the present study. Seventy-nine of the included women did not deliver a valid response to the secondary outcome. Therefore, the total study population for the secondary analysis was 19,943 ([Table S2, Appendix](#)).

Statistical analysis

Binomial regression analysis was performed to estimate the PP of parous and nulliparous Danish women who did not adhere to the WHO guidelines for MVPA. Additionally, the analysis aimed to estimate the PP for parous and nulliparous women within each of the four leisure-time intensity groups.

Lastly, binomial regression analysis was performed to estimate the prevalence proportion ratio (PPR) and the prevalence proportion difference (PPD) and the corresponding 95% CI between the parous and nulliparous women based on the WHO PA guidelines for MVPA. Crude PP, PPR, and PPD were reported for the total study population and within each of the four age groups separately. No adjustments were made for potential confounding due to the predictive nature of the present study.⁴² All statistical analyses were performed in Stata, and the alpha level for statistical significance was set at 0.05.

Results

Sample characteristics

[Table 1](#) displays the key covariates of the study population showing numbers and percentages for each covariate separately among those adhering and those non-adhering. Among women with the lowest level of educational attainment, the proportion of non-adhering women was higher compared with their adhering peers (14.3% vs. 10.4%). Likewise, in the subgroup of women living in rural areas with populations of fewer than 1000, the proportion of non-adhering women surpassed that of adhering women (17.0% vs. 13.7%). In terms of age distribution, the women were almost evenly spread across the age groups, 5484 (27.4%) aged 20–25 years, 4759 (23.8%) aged 26–30 years, 4682 (23.4%) aged 31–35 years, and 5097 (25.4%) aged 36–40 years. Lastly, 48% of the parous women were categorised with a parity of 2, indicating they had given birth to two children.

Non-adherence to the WHO PA guidelines in parous and nulliparous women

The statistical analysis revealed a notable disparity between parous and nulliparous women in non-adherence to the WHO PA guidelines for MVPA. Specifically, the analysis showed that 63.8%

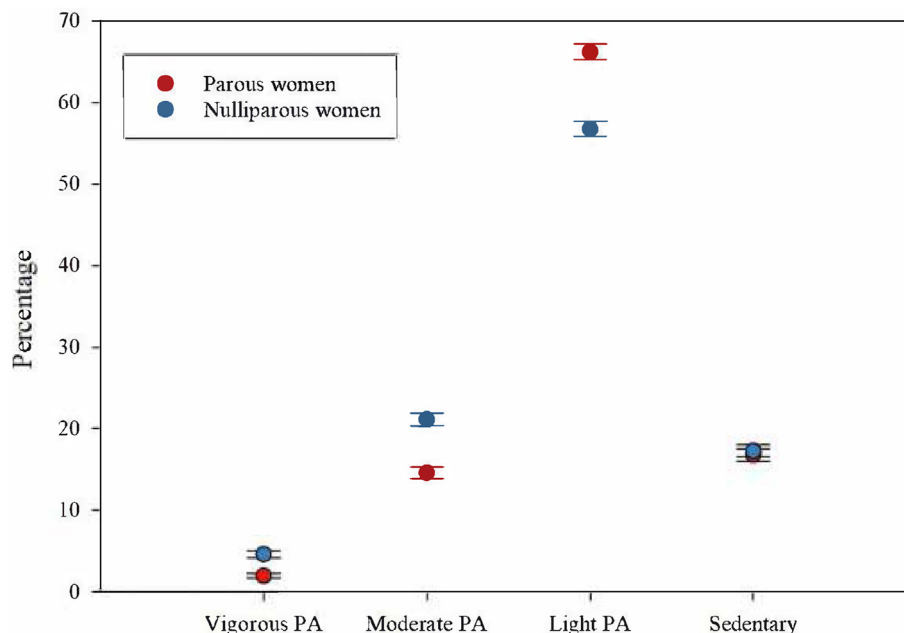


Fig. 2. Proportions of Parous and Nulliparous women reporting sedentary behavior or physical activity (PA) at light, moderate, or vigorous intensity levels during their leisure time.

(95% CI 62.9; 64.8) of parous women did not adhere to the guidelines, which is 12.5 percentage points higher than the 51.3% (95% CI 50.4; 52.3) observed among the nulliparous women (Table 2). This corresponds to a PPR of 1.24, which supports our hypothesis that parous women are less likely than their nulliparous peers to adhere to the WHO PA guidelines for MVPA. Furthermore, the analysis across different age groups showed that women aged 26–30 years exhibited the most statistically significant difference in non-adherence between parous (69.3%, 95% CI 67.1; 71.6) and nulliparous women (48.9%, 95% CI 47.1; 50.6).

Description of leisure-time PA

Most parous women, totaling 6180 women (66%), reported engagement in low-intensity PA such as walking, biking, or other kinds of light PA during their leisure time (Fig. 2) (Table S2, Appendix). Importantly, the PP of parous women engaging in vigorous or moderate leisure-time PA was 1.9% (95% CI 1.7; 2.2) and 14.6% (95% CI 13.9; 15.3), respectively. In contrast, their nulliparous peers showed higher proportions at these intensities, with PPs of 4.6% (95% CI 4.2; 5.0) and 21.1% (95% CI 20.3; 21.9). Interestingly, minimal difference was seen between the proportion of parous and nulliparous women reporting sedentary behavior as their primary leisure-time PA: 16.8% (95%CI 16.0; 17.5) of parous women and 17.3% (95%CI 16.5; 18.0) of nulliparous women.

Discussion

Key findings

To the best of our knowledge, the present study represents the largest European population-based study aimed at investigating differences between parous and nulliparous women in the non-adherence to the WHO PA guidelines of doing 150 weekly minutes of moderate to vigorous PA. Our findings, which showed a PPR of 1.24, build upon and further extend the existing literature.^{26–31,33,43} The findings demonstrate that parous women, in comparison with their nulliparous peers, represent a distinct

subgroup of the population, with a heightened risk of non-adherence to the WHO PA guidelines for MVPA.

Comparison with other studies

Data from 13 independent studies examining differences in PA between parous and nulliparous women were discussed in a Canadian narrative review from 2008.²⁶ The overall findings indicated that parous women face an increased risk of being insufficiently physically active compared with nulliparous women. Notably, only one of the 13 studies was conducted in Europe, a cross-sectional study involving 707 English women in the mid-1980s.⁴⁴ This European study was one of three out of the 13 studies that did not align with the overall findings of the review.²⁶ Additionally, three studies, from North America investigated self-reported PA in parous and nulliparous women from the same population-based cohort, the National Health and Nutrition Examination Survey (NHANES), spanning different time periods from 2007 to 2018.^{29,31,33} Overall, their findings support our findings in the present study. For instance, Carson et al. examined 4231 women aged 20–65 years and found that women with children in the household were significantly less likely to adhere to the WHO PA guidelines of a minimum of 150 weekly minutes of MVPA compared with women reporting no children in the household (OR 0.69; 95% CI 0.56; 0.84).³³

Our analysis revealed another important finding; young parous women, particularly those aged 20–30 years, exhibit the most notable divergence in adherence to the WHO PA guidelines for MVPA compared with nulliparous women in the same age group. Specifically, the PPR was 1.39 (95% CI 1.28; 1.50) for women aged 20–25 years, whereas it was 1.42 95% CI (1.35; 1.49) for women aged 26–30 years. In a population-based Canadian study²⁸ from 2012 involving a sample of 1237 women aged 20–65 years who wore an accelerometer for seven consecutive days, the largest difference in weekly hours of MVPA was observed between women with children under the age of 6 years (17.7 (95% CI 13.8; 21.6) minutes of MVPA per week) and women without dependent children at home (22.9 (95% CI 19.2; 26.6) minutes of MVPA per week). The authors of this study advocated for future research to further

Table 1
Characteristics of Parous and Nulliparous Women in the Danish National Health Survey 2021 (percentage).

	Women 'not adhering' to WHO PA guideline n = 11,445 (100%)	Women 'adhering' to WHO PA guideline n = 8577 (100%)	Total n = 20,022 (100%)
Childbirth status			
Parous	5960 (52.1)	3378 (39.4)	9338 (46.6)
Nulliparous	5485 (47.9)	5199 (60.6)	10,684 (53.4)
Parity			
1	2102 (35.3)	1080 (32.0)	3182 (34.1)
2	2839 (47.6)	1665 (49.3)	4504 (48.2)
3	767 (12.9)	477 (14.1)	1244 (13.3)
4	117 (2.0)	71 (2.1)	188 (2.0)
≥5	27 (0.5)	16 (0.5)	43 (0.5)
Unknown	108 (1.8)	69 (2.0)	177 (1.9)
Age (years)			
20–25	2877 (25.2)	2607 (30.4)	5484 (27.4)
26–30	2659 (23.2)	2100 (24.5)	4759 (23.8)
31–35	2865 (25.0)	1817 (21.2)	4682 (23.4)
36–40	3044 (26.6)	2053 (23.9)	5097 (25.4)
Cohabitation^a			
Living alone	4021 (35.1)	3565 (41.6)	7586 (37.9)
Living with someone	7424 (64.9)	5012 (58.4)	12,436 (62.1)
Children living at home^b			
No	4733 (41.4)	4495 (52.4)	9228 (46.1)
Yes	6712 (58.6)	4082 (47.6)	10,794 (53.9)
Educational level (years)			
≤10	1635 (14.3)	890 (10.4)	2525 (12.6)
11–15	4913 (42.9)	3662 (42.7)	8575 (42.8)
≥16	3987 (34.8)	3295 (38.4)	7282 (36.4)
Unknown	910 (8.0)	730 (8.5)	1640 (8.2)
Country of origin			
Denmark	9554 (83.5)	7507 (87.5)	17,061 (85.2)
Other western	644 (5.6)	566 (6.6)	1210 (6.1)
Non-western	1247 (10.9)	504 (5.9)	1751 (8.7)
Income (tertiles)			
1st	3803 (33.2)	2825 (33.0)	6628 (33.1)
2nd	4021 (35.2)	2654 (30.9)	6675 (33.3)
3rd	3597 (31.4)	3078 (35.9)	6675 (33.3)
Negative or zero	24 (0.2)	20 (0.2)	44 (0.3)
Urbanization			
>100,000	4278 (37.4)	4061 (47.3)	8339 (41.6)
20,000–100,000	2041 (17.8)	1396 (16.3)	3437 (17.2)
1000–20,000	3155 (27.6)	1929 (22.5)	5084 (25.4)
<1000	1947 (17.0)	1174 (13.7)	3121 (15.6)
Unknown	24 (0.2)	17 (0.2)	41 (0.2)
Employment status			
Employed	7429 (64.9)	5673 (66.1)	13,102 (65.4)
Unemployed ^c	4016 (35.1)	2904 (33.9)	6920 (34.6)

^a Based on civil status and family type.

^b Nulliparous women can have children living at home due to family type.

^c Includes women enrolled in education and social security.

Table 2
Non-adherence to the WHO physical activity guidelines in Parous and Nulliparous women, with age-related patterns shown in numbers, proportions, and differences.

	Total (100%)		Non-adhering women			Differences between parous and nulliparous non-adhering women					
	n	%	n	%	95% CI	PPR	95% CI	P-value	PPD	95% CI	P-value
All											
Parous	9338		5960	63.8	(62.9; 64.8)	1.24	(1.21; 1.27)	<0.001	12.5	(11.1; 13.8)	<0.001
Nulliparous	10,684		5485	51.3	(50.4; 52.3)	Ref (1)			Ref (0)		
Age 20–25 years											
Parous	296		211	71.3	(66.3; 76.6)	1.39	(1.28; 1.50)	<0.001	19.9	(14.6; 25.2)	<0.001
Nulliparous	5188		2666	51.4	(50.1; 52.8)	Ref (1)			Ref (0)		
Age 26–30 years											
Parous	1633		1132	69.3	(67.1; 71.6)	1.42	(1.35; 1.49)	<0.001	20.5	(17.6; 23.3)	<0.001
Nulliparous	3126		1527	48.9	(47.1; 50.6)	Ref (1)			Ref (0)		
Age 31–35 years											
Parous	3228		2082	64.5	(62.9; 66.2)	1.20	(1.14; 1.26)	<0.001	10.6	(7.6; 13.7)	<0.001
Nulliparous	1454		783	53.9	(51.4; 56.5)	Ref (1)			Ref (0)		
Age 36–40 years											
Parous	4181		2535	60.6	(59.2; 62.1)	1.09	(1.03; 1.16)	0.007	5.1	(1.5; 8.6)	0.005
Nulliparous	916		509	55.6	(52.4; 58.9)	Ref (1)			Ref (0)		

explore parental PA during the early childhood phase. Additionally, one of the aforementioned studies, based on the American NHANES,³³ found that having young children aged ≤ 5 years in the household was associated with lower odds of adherence to the PA guidelines (OR 0.58; 95% CI 0.46–0.73) compared with children aged 6–17 years in the household (OR 0.77; 95% CI 0.62–0.96), with the reference group being women with no children. The findings from these two studies support the observed statistically significant difference found in the present study between non-adhering parous and nulliparous women in the younger age group.

We also found that the majority of parous women primarily engaged in light-intensity PA in their leisure time, such as walking and biking. Conversely, only 2% of parous women reported to engage in vigorous PA in their leisure time. Interestingly, no discernible difference was seen between the proportion of parous and nulliparous women reporting sedentary behavior during their leisure time, 17% among both parous women and nulliparous women. The preference for walking as primary leisure-time PA in this subgroup was also reported in a prospective American study from 2007,⁴⁵ which revealed a decrease in PA from pre-pregnancy to 6 months postpartum in all aspects except for time spent on walking as exercise, which remained at the same level.

Clinical implications

The findings of the present study indicate that parous women constitute a large subgroup in the population, which tends to exhibit lower adherence to the WHO PA guidelines for MVPA compared with their nulliparous peers. Existing literature has suggested several potential explanations for the lower PA levels among parous women, as compared to nulliparous women. These include challenges in finding the time for PA, feelings of fatigue, no energy, and exhaustion, as well as a lack of social support and childcare availability.^{46,47} These factors underscore the need for targeted interventions and support systems to promote PA among parous women, with a view to addressing the specific barriers they may face in adhering to PA guidelines.^{48,49}

By identifying parous women as a distinct subgroup of the population who adhere less to the WHO PA guidelines for MVPA than their nulliparous peers may help policymakers and healthcare practitioners target strategies aimed at promoting PA in this group. Such strategies may involve PA-friendly environments in the community, as suggested by Adamo et al.,²⁸ thereby facilitating easy and safe adaptation of active lifestyles for parents, either with or without their children. This could include park walking, cycling for transportation, well-lit paths, or sidewalks, and community fitness centers, or training programs offering childcare facilities.

In addition, prior research has underscored the lack of healthcare-guidance and insufficient information from community and recreational centers as a barrier for PA among parous women.^{50,51} Maternity care programs and postpartum healthcare support vary across countries. Therefore, it is imperative to emphasize the need for regional insights into PA patterns among parous women, before undertaking future research to develop enhanced healthcare support interventions as a means to promoting PA in this subgroup. As we found light PA, like walking, biking, and light gardening, to be the preferred leisure-time PA among parous women, similar PA emerges as a potential target for policy makers and healthcare professionals seeking to enhance PA in this subgroup. However, as walking constitute light PA, this would not increase the proportion of parous women adhering to the WHO PA guidelines for MVPA right away, but it may be a start, that eventually leads women to more activity with higher intensity. Also, recent WHO PA guidelines are updated with the slogan 'Every Move counts',² a trend that is seen incorporated in many countries'

PA guidelines.⁵² Nonetheless, to move parous women from doing light PA to more MVPA calls for successful recruitment and retention strategies consisting of partnering with healthcare users, respected community stakeholders, and well-trained staff, who are matched to the population of interest.⁵³ Therefore, the authors of the present study encourage researchers, health professionals, healthcare users, and local communities to co-produce PA interventions at a MVPA level, which in line with walking, should be practical, easily integrated into daily routines,⁵⁴ and sustainable for planetary health⁵⁵ when targeting parous women. Based on the observed proportions (Table 1) of non-adherence among women characterized by lower levels of education and rural residency, we suggest future studies to delve deeper into the potential association with these demographic groups. This would aid in refining the target group for future PA interventions among parous women.

Strengths and limitations

The present study has some limitations worth noting. First, the primary outcome measure, leisure-time MVPA, relied on self-reported data. Therefore, it was susceptible to social desirability bias and recall problems, such as recalling the incorrect intensity.⁵⁶ It has been suggested that recalling light PA is the most challenging due to its prevalence in everyday routines, such as household activities.⁵⁷ Specifically, parous women may underestimate their light PA as they may not consider walking with a stroller or playing with their children as being PA. However, our findings showed higher engagement in light PA in parous women, which suggests limited risk of overestimating differences between groups. Second, the data collection for the DNHS 2021 took place during the COVID-19 pandemic, which may have influenced the reported weekly minutes of PA. In the 2021 DNHS, 61% of women aged 16 years and older did not adhere to the WHO PA guidelines.²⁴ This percentage appears notably high when compared with data from previous years of the DNHS,⁵⁸ and the pooled data analysis conducted by Guthold et al. Nonetheless, the large sample size of both exposure groups, parous and nulliparous women, is a strength of the present study. Thus, despite potential recall problems due to self-reporting and COVID-19, the comparisons are likely to remain fairly unaffected because recall is unlikely to differ between groups.

Conclusion

The present study aimed to examine whether the non-adherence to the WHO PA guidelines differ between parous and nulliparous women, as the WHO has recommended national population surveillance systems to track trends of PA in parous women.¹ This population-based study, which involved 20,022 Danish women, revealed that a higher proportion of parous women do not adhere to the WHO PA guidelines for MVPA compared with their nulliparous peers. Furthermore, the findings suggest that the majority of parous women engage primarily in light PA, such as walking and biking, during their leisure time. The findings provide new insight into PA among parous women in European populations. It is crucial to consider these findings when developing future healthcare interventions aimed at initiating or resuming MVPA at the recommended levels among parous women.

Author statements

Acknowledgments

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Ethical approval

Ethical approval for the study was provided by the legal department at the University of Southern Denmark. Moreover, according to Danish law, individual-level linkage of data from for example, surveys and administrative registries is allowed without further consent when it is for research purposes and when thoroughly ensuring that results are presented in an anonymized way.

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Competing interests

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

Contributors statement

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Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used AI-assisted technology as inspiration to improve readability and language in the paper. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the originality and the content of the publication.

Appendix A. Supplementary data

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