

# Identification of motives and barriers to physical activity of Polish young mothers

**Andrzej Soroka**

Uniwersytet Przyrodniczo Humanistyczny w Siedlcach

**Agnieszka Godlewska** (✉ [godlewskaa@uph.edu.pl](mailto:godlewskaa@uph.edu.pl))

Uniwersytet Przyrodniczo Humanistyczny w Siedlcach <https://orcid.org/0000-0003-1553-0867>

**Elżbieta Krzęcio-Nieczyporuk**

Uniwersytet Przyrodniczo Humanistyczny w Siedlcach

**Paulina Kozioł**

Uniwersytet Przyrodniczo Humanistyczny w Siedlcach

---

## Research article

**Keywords:** physical activity, young mothers, rural areas, urban areas, motives and barriers

**Posted Date:** March 3rd, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-15725/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

**Version of Record:** A version of this preprint was published on September 11th, 2020. See the published version at <https://doi.org/10.1186/s12905-020-01061-y>.

# Abstract

**Background** The aim of the study was to determine the level of physical activity of young mothers living in rural and urban areas and their free time budget, as well as to indicate motivating factors and barriers encountered during physical activity. **Methods** In the study a diagnostic survey method was applied, including two survey IPAQ questionnaires – the long version and author's questionnaire. A representative sample consisted of 1 064 young mothers giving birth in 2017. Student T test and discriminate function analysis were used in statistical analysis. **Results** The level of physical activity of young mothers from rural areas did not differ from that of young mothers from urban areas. However, certain differences appeared while taking into account different aspects of physical activity. The main motives for participation in physical activity of young mothers from rural areas were to improve their physical condition and reduce pain complaints. Young mothers from towns emphasized such motives as strengthening self-confidence and improving their position in the family. While the main barriers for both group of respondents in physical activity were the lack of money and interest in occasional events. **Conclusions** The main conclusion that arise from the study is to need to make efforts which aim to reduce the burden of daily duties of young mothers, strengthen family support, strengthen material status of young families, eliminate barriers related to infrastructure especially of villages in order to facilitate the access to physical activity, raise awareness among population on the importance of health education, create specialized educational programs to promote healthy lifestyle, and finally, to introduce systematic monitoring in order to understand determinants of physical activity of young mothers.

## Background

Lifestyle is one of the four main determinants of human health with its most important element that is physical activity, next to physical and social environment, genetic factors and organization of medical care. The physical activity is essential for the proper functioning of human body, health, morbidity and mortality [1, 2].

Physical activity causes numerous mental health benefits, which include improvements in well-being, reduction of depression and anxiety, enhancements of cognitive functioning and improvements in overall quality of life [3, 4].

Modern public health studies focus on determinants of physical activity in order to fight the pandemic development of non-communicable diseases [5] such as cardiovascular disease, cancer, depression, hypertension, diabetes, and osteoporosis [6–8].

Globally, many adults and children do insufficient physical activity to maintain good health [9]. The population burden of inactivity is unacceptably high, this also applies to women [10–13]. It was found that a high socioeconomic position (including occupational position, income and educational level) positively correlates with a higher degree of physical activity in leisure time [14–15].

Despite so many health benefits, women's participation in physical activity is lower than men's. It is observed especially among women who lack sports and recreational skills, and have lower socioeconomic and material status [16]. It has been shown that women's participation in physical activity during their free time declines throughout their life, especially during maternity period [17, 18].

There is evidence to suggest that the onset of parenthood may cause a decline in physical activity of adults [19, 20] as it is associated with decreased sleep time, increased stress, anxiety and reduced mental well-being [21].

The additional demands of parenthood necessitate lifestyle changes and decreases the physical activity of young parents [22]. This applies to both groups, mothers and fathers, however women experience declines in their physical activity to a greater degree [13].

According to social cognitive theory there is a relationship between environment and behavior [23]. Studies have shown a link between environmental factors and physical activity [24].

Neighborhood environment attributes such as the presence of other people being active and access to exercise facilities, are physical activity behaviors associated with adults from rural areas [25]. Rural communities are notably different from urban ones and unique consideration should be given to them when assessing the relationship between the environment and physical activity [26].

The aim of the study is to determine the level of physical activity of young mothers living in rural and urban areas and their free time budget, as well as to define the hierarchy of motivating factors and barriers that they encounter during physical activity.

The research hypothesis assumes that young mothers from rural areas have lower level of physical activity and less free time than mothers living in urban areas. Additionally, the main barriers that affect a level of participation in physical activity of young mothers from rural areas are the lack of time, limited financial resources, difficult access to sports and recreation infrastructure, and small support from their families.

## **Materials And Methods**

### **Study Population**

In the sampling procedure, in its first step, the quota sampling was applied. The total population of Polish women who gave birth to living children in 2017 was 357 400 [27], and it was divided into two groups: women living in rural areas and those living in towns and cities. While determining the size of representative sample, which eventually consisted of 1 064 respondents, the confidence level was set at 0.95, the estimated size fraction at 0.42, and the maximum error at 0.03. The survey was conducted on the basis of respondents' availability, until the limit was reached for each province. The study was carried

out in April 2018 among young mothers who gave birth in 2017. In order to collect the study material, the following web portals were used: forum.e-mama.pl, webmama.pl, familie.pl and maluchy.pl.

The study conforms to the code of ethics of the World Medical Association and the standards for research recommendations of the Helsinki Declaration. The protocol was approved by the local university ethics committee at the Siedlce University of Natural Sciences and Humanities. To ensure confidentiality, all data were anonymized before analysis. The survey was conducted in the form of telephone inquiries, where the interviewers asked questions to respondents and applied responses to prepared spreadsheets. The standard interview with the respondents lasted 10 min.

## Data Collection and Definitions

A diagnostic survey with two research tools (survey questionnaires) were used in the study. The first is IPAQ (International Physical Activity Questionnaire) - long version, developed as a surveillance instrument for measuring four areas of physical activity: professional work, housework and around the house, sports and recreation, as well as everyday movement [28]. The questionnaire is a proven and widely used method for determining a level of physical activity [29].

The second questionnaire is the author's survey questionnaire which aims to diagnose leisure time budget of young mothers and determine the hierarchy of motivating factors and barriers that respondents have to cope with while making attempt to participate in physical activity. The above-mentioned aims refer to a socio-demographic factor that is the place of residence.

A five-point Likert scale was used to measure attitudes. The use of questionnaire survey was preceded by two-stage pilot studies which allowed evaluating the content of the questionnaire, examining its reliability, validity, and discriminate power.

## Descriptive Statistics Of Participants

The analytical material was collected on the basis of 1064 questionnaires; 446 questionnaires were fulfilled by respondents from rural areas, while 618 from towns and cities around Poland. The average age of respondents living in rural areas was  $25.3 \pm 1.8$ , while those from urban areas  $29.3 \pm 4.9$ . The body mass of respondents from rural areas was  $60.7 \pm 8.9$  kg and the body height  $165.7 \pm 3.5$  cm. In the case of young mothers from urban areas, the body mass was  $62.7 \pm 9.6$  kg and the body height  $167.3 \pm 5.8$  cm. On the basis of calculated BMI, it was shown that 30.7% of young mothers from rural areas were underweight, 46.3% represented normal weight-growth ratio, while 22.9% were overweight. In the case of respondents from urban areas, 25.6% were underweight, 59.7% had normal parameters, while 14.6% were overweight. Additionally, 53.9% of women residing in rural areas had a university degree, 42.2% the average educational level, while 3.9% declared professional or basic educational skills. On the other hand, 79.5% of respondents from urban areas declared higher education, 17.8% the average level of education,

while 2.7% basic or professional. The high economic status was declared by 8.2% of women from towns and cities and none from rural areas, the average economic status was referred by 57.4% women from rural areas and 50.1% from urban areas, while low economic status concerned 42.4% of respondents from rural areas and 41.7% from urban areas.

The study sample consisted of 88.5% of young mothers from villages having one child and 11.5% with two children. In the case of urban residents, 55.4% of them had one child, 32.4% two, 8.2% three, and 4.0% four or more children. The sample of respondents from towns and cities was divided into 92.0% of those having full family and 8.0% with incomplete families. In the case of respondents from rural areas, 88.3% had full family and within this group 22.9% declared extended family status, which did not occur in the case of respondents from towns and cities, while 11.7% were single-parent families.

## Statistical Analysis

The Statistica 13.1 PL software with a set of tests was used for statistical analysis. It was applied to calculate statistical averages and standard deviations. Additionally, the following tests were applied: Shapiro-Wilk normality test, Student t test, Chi-square compliance test, and a test of discriminate function analysis. They were applied to determine which factors of studied phenomena discriminate two naturally emerging groups. The test of discriminate function analysis consisted of calculating values of classification functions in a form of their coefficients. Prior to discriminate analysis, the multivariate normality was verified by checking each variable for its distribution normality. It was assumed that the variable variance matrices were homogeneous within groups. Slight deviations were not valid due to the size of groups, which were respectively: 618 in urban and 446 in rural areas. Differences of mean values of which probability of uncertainty was less than  $p < 0.05$ , were defined as statistically significant.

## Results

While analyzing the obtained results, no significant differences appeared in the level of physical activity between young mothers living in rural and urban areas. However, certain significant differences appeared in particular areas of physical activity. Higher levels of physical activity at  $p < 0.001$  appeared among respondents from towns and cities in the area of professional work, movement and participation in recreation and sports, while respondents from rural areas showed significantly (at  $p < 0.001$ ) higher level of physical activity related to housework (Table 1).

**Table 1 The level of physical activity in each of its areas at Polish young mothers living in rural and urban areas (in MET-min./week)**

Area of physical activity	Urban area		Rural area		<i>t</i> -test value	<i>p</i> value
	$\pm SD$	n	$\pm SD$	n		
Total activity	4691.3 $\pm$ 2562.3	618	4674.6 $\pm$ 2025.2	446	0.240	0.810
Job	682.5 $\pm$ 642.1	618	1050.6 $\pm$ 623.2	446	4.931	0.001*
Movement	612.5 $\pm$ 554.3	618	993.6 $\pm$ 523.2	446	4.603	0.001*
Work at home	2548.6 $\pm$ 1765.2	618	1386.3 $\pm$ 723.8	446	4.101	0.001*
Sport and recreation	847.7 $\pm$ 423.9	618	1244.7 $\pm$ 762.2	446	6.402	0.001*

\* - difference significant at  $p < 0.005$

High critical value of test at  $p < 0.001$  pointed to a significant dependence between the amount of free time and place of residence of respondents. The dependencies concerned both leisure budget of young mothers at the weekdays as well as at the weekends, when nearly half of them declared daily limit of free-time to about 2 hours. A greater number of respondents from villages than from urban areas had free time in a dimension more than 5 hours a day. At the weekdays it referred to three times greater number of women, while at the weekends twice more than in the case of respondents from urban areas. Nearly two times less women from rural areas than from towns and cities declared to have free time in a dimension less than two hours at weekdays and nearly the same at weekends (Table 2).

**Table 2 Free time budget of Polish young mothers on weekdays and weekends with regard to their residence place**

Days	Place of residence	Free time budget (%)			
		Below 2 hours	From 2 to 5 hours	Above 5 hours	Total
Weekdays	Urban area	37.42	18.13	2.41	57.96
	Rural area	19.38	14.46	8.20	42.04
	Total	56.8	32.59	10.61	100.00
Pearson chi-square		71.937		$p = 0.001^*$	
Weekends	Urban area	26.62	19.38	11.96	57.96
	Rural area	19.38	0.00	22.66	42.04
	Total	46.00	19.38	34.62	100.00
Pearson chi-square		226.598		$p = 0.001^*$	

\* - difference significant at  $p < 0.05$

The high value of test indicated a significant difference between observed values and expected values. This was confirmed by a significant dependence at  $p < 0.001$  between young mothers' declarations on dimension of free time and their place of residence. Nearly twice as many respondents from rural areas than from urban areas declared that their free time was fully sufficient. Interestingly, more young mothers from rural areas declared that they could have more free time. There were no respondents from rural areas that suffered from a total lack of free time, whereas in the case of respondents from towns and cities this number accounted for over 10%. Regardless of the place of residence, more than 44% of all respondents declared that they do not have enough free time (Table 3).

**Table 3 Dimension of leisure time of Polish young mothers living in rural and urban areas**

Place of residence	Leisure time dimension (%)				Total
	It is completely enough	It could be more	I have it too little	No free time	
Urban area	6.36	13.40	26.42	11.76	57.97
Rural area	9.74	14.46	17.84	0.00	42.04
Total	16.10	27.87	44.26	11.76	100.00
Pearson chi-square		123.894		p=0.001*	

\* - difference significant at  $p < 0.05$

Among eleven motives proposed in the survey affecting participation of young mothers in physical activity, six of them were in the model of discriminate function. The following motives were not included in this model: creating healthy lifestyle, improving the beauty, improving personal well-being, strengthening the body immunity and weight loss. While assessing discriminatory power, presented in the form of Wilks' Lambda, significant differences in values of particular factors in the model were found between two groups surveyed. The highest value of classification function was reached by a factor related to a desire to improve health condition through participation in physical activity, which was significantly more important at  $p < 0.001$  for respondents from rural areas than from urban areas.

For young mothers from rural areas, significantly more important than for those living in towns and cities, was to participate in physical activity in order to reduce pain complaints ( $p < 0.001$ ). On the other hand, such motives as strengthening self-esteem ( $p < 0.001$ ), strengthening position in the family ( $p < 0.001$ ) or relieving stress ( $p = 0.002$ ) were significantly more important for women from urban areas than from the

village. Additionally, the motive of toughening the body through physical activity was more strongly exhibited by respondents from urban areas (Table 4).

**Table 4 Motives affecting the actively spent free time by young mothers from urban and rural areas**

Motive	Model of discriminant analysis			Classification functions	
	Wilks' Lambda	F of	p level	Urban area	Rural area
	Wilks' Lambda: 0.437			Place of residence	
	F (10.212)=6.945 p<0.001				
	Wilks' Lambda	F of	p level	Urban area p=0.580	Rural area p=0.420
	introduction				
Improving the health	0.472	120.980	0.001*	1.498	2.803
Improving the self-confidence	0.466	72.555	0.001*	1.632	0.611
Relieving the pain	0.513	41.147	0.001*	0.007	0.610
Strengthening the status in family	0.505	30.540	0.001*	1.139	0.761
Rebounding the stress	0.489	9.335	0.002*	0.177	0.101
Hardening of the body	0.484	2.445	0.118	0.123	0.068
Constant				7.761	9.591

\* - difference significant at p<0.05

Source: Own data on a base of study results

On the basis of discriminate analysis and Wilks' Lambda values, there were found significant differences in values of individual barriers faced by young mothers from rural and urban areas while participating in physical activity. Within six factors that were found in the model of discriminate function concerning barriers, the lack of money was the most often declared by all respondents. This factor, to a greater extent, was recognized among young mothers from urban areas, whose values of expression were significantly higher ( $p = 0.008$ ) than of respondents from the countryside. The factor associated with young mothers' lack of interest in offers of active recreation reached high values in both groups of respondents. However, this factor concerned, to a greater extent, young mothers from urban areas, whose declarations were significantly higher at  $p=0.004$ . On the other hand, such barriers as the lack of offers from the centers organizing active recreation (at  $p=0.002$ ), the lack of family support (at  $p<0.001$ ), and the lack of free time (at  $p<0.001$ ) were more often declared by young mothers from rural areas than from towns and cities. The lack of access to sports and recreation facilities was another important factor which had a great influence on the frequency of participation in physical activity of respondents.

Interestingly, this barrier was more often encountered (at  $p < 0.001$ ) by young mothers from urban areas rather than from rural areas (Table 5).

**Table 5 Barriers affecting the active leisure time by Polish young mothers living in rural and urban areas**

Barrier	Model of discriminant analysis			Classification functions	
	Wilks' Lambda: 0.507 F (10.212)=6.945 $p < 0.001$			Place of residence	
	Wilks' Lambda	F of introduction	p level	Urban area p=0.580	Rural area p=0.420
No offers of centers	0.508	9.273	0.002*	1.443	1.724
No family support	0.501	132.017	0.001*	0.408	1.328
No free time	0.493	17.044	0.001*	0.928	1.318
No access to sport facilities	0.521	13.581	0.001*	1.726	1.386
No interests in offers	0.507	8.319	0.004*	5.252	5.003
No financial resources	0.486	6.919	0.008*	7.641	7.401
	Constant			21.347	

\* - difference significant at  $p < 0.05$

Source: Own data on a base of study results

## Discussion

There is no evidence for research hypothesis that assumed a lower level of physical activity among young mothers from rural areas, compared to those living in urban areas. The levels of physical activity in both groups surveyed were at similar levels, thus study results conducted in the United States, which showed significant difference in favor of women from urban areas, were not confirmed [30, 31]. In the case of young Polish mothers, significant differences resulted only from different types of physical activity. Female respondents from rural areas spent nearly half of their physical activity on housework and outside works. Such study results are not surprising as many women from countryside connect their housework with work on the farm. It is a common phenomenon, often being compared to household activities done by women (housework and childcare), which are significant factors influencing high daily levels of physical activity [32].

In both studied populations of young Polish mothers, around 25% of total physical activity was related to sports and recreational activities, without a clear indication of the prevalence of any group surveyed. Dzewaltowski et al. [33] point out that in the case of children strongly attached to their families, what can be observed in multigenerational families, there is a higher probability of taking over the same patterns. This applies particularly to female children who learn their parents' approach to physical activity, especially of mothers, and introduce these patterns to their own families in the future [34, 35]. Hence, a statement arises that physical activity gives not only health benefits, but also a potential to provide their offspring with appropriate cultural behaviors related to healthcare, what has been also confirmed by other authors [36, 37].

A part of research hypothesis concerning leisure time budget did not work in the case of young mothers from rural areas. This was due to the fact that young women from countryside, especially on weekdays, had much more leisure time than women living in towns and cities. To a great extent, it is due to the fact that many women from urban areas function in multigenerational families. This helps them to save more free time as all duties are divided among a greater number of family members. Both studied groups of young mothers, compared to men, experience some restrictions in leisure time budget. This applies especially to housework duties and family responsibilities, which to a great extent limit their free time spent on physical activities [38]. It is also worth mentioning that mothers with young children tend to protect at first the needs of their children, and then they meet their own ones [39], often feeling that they are not entitled to have time for leisure. According to some authors [40, 41], this makes them unable to participate in physical activity regularly.

The above-mentioned opinions and studies presented in this paper show that contemporary Polish young mothers living in rural areas reasonably manage their time, as it is evident in the dimension of free time that is at their disposal. This is reflected in the reduced severity of their declarations on the lack of free time than it was a decade earlier [42].

When analyzing the results of studies, the hypothesis that the lack of financial resources is a barrier for young mothers from rural areas to perform physical activity has been confirmed. On the other hand, the hypothesis that the lack of access to sports and recreation facilities is a reason for non-participation in physical activity has been not proven. It is worth emphasizing that the previous studies [25, 43] indicated that environmental factors and the lack of access to sports and recreation infrastructure were barriers which significantly exerted a negative impact on the level of participation in physical activity of women from rural areas.

The conducted studies showed that young mothers living in rural areas, to a significantly greater extent than women from urban areas, felt the lack of support from their families, what proved assumptions of this part of research hypothesis. At the same time, conducted studies confirmed that women from rural areas wanted to underline the importance of their position in the family as well as strengthen their self-esteem [44, 45]. It should be noted that the same factors, with even greater intensity, were declared by women from urban areas. This shows that women, in general, feel unappreciated by their families [46,

47]. It should be noted that in conducted studies these factors proved to be even more important than more traditional problems such as weight loss, improving the beauty or creating healthy lifestyle through participation in physical activity.

The analysis of questionnaire responses reveals that the fact of being a mother is an important factor of deficiency of active behavior, what is confirmed in studies carried by other authors [48–50]. It has been found that low economic status that often occurs in the case of young families, results in young mothers' reluctance and the lack of pleasure and motivation to participate in physical activities [51, 52].

## **Conclusions**

The priority for young mothers and their families living in rural and urban areas is the growth of their financial resources, and thus the raise of their material status. These problems affect particularly young mothers who are obligated to educate and protect needs of their children. Young mothers, to some extent, should have less daily duties in order to be able to participate in physical activity. This will help them reduce stressful situations and will have a good influence on restoring a sense of control over their own health and well-being. Young mothers, especially from rural areas, should have more support from their families, especially from their husbands who may help them in raising children. This may eliminate stereotypes of young mothers who do not have any free time. Such approach will also strengthen a position of young mothers in the family and in the society. Elimination of barriers associated with infrastructure of rural areas such as building bicycle and pedestrian paths, will help young people, including young mothers, spend their free time actively. This social support with the support of a spouse and more distant family are factors which have a positive influence on active behavior of young mothers. The creation of specialized programs related to physical activity and organization of group activities by professionals will give the opportunity for young mothers, especially from rural areas, to spend their free time actively. There is a need to introduce systematic monitoring of young mothers' participation in physical activity, especially research panels that will define tendencies as well as allow identification and systematic comparison of young mothers' behaviors in relation to other social groups. Such studies would aim at understanding determinants of physical activity of young mothers from rural areas. They would also help them by influencing public health policy, especially increasing participation of this population in physical activity during free time.

## **Declarations**

### **Acknowledgements**

Not applicable

### **Author Contributions**

AS, AG and EK-N conceptualized the original study. AS and AG data collection, data analysis, manuscript writing/editing, EK-N and PK data collection, data analysis. All authors have read and approved the final

manuscript.

## **Funding**

The results of the research carried out under the research theme No. 7/19/B were financed from the science grant granted by the Ministry of Science and Higher Education The funding source

had no role in the design, implementation, data collection, analysis and interpretation of results or in dissemination of findings.

## **Availability of data and materials**

The data supporting our findings are found at, kept in confidentiality and stored at the corresponding author both in hard and soft copies. If someone wants our data, we are voluntary to share it and the corresponding author should be contacted through the email address on the cover page.

## **Ethics approval and consent to participate**

The study conforms to the code of ethics of the World Medical Association and the standards for research's recommendation of the 1964 Helsinki Declaration. The protocol was approved by the University Ethics Committee Siedlce University of Natural Science and Humanities. To ensure confidentiality, all data were anonymised before analysis. Before the respondents started to answer the questions posed in the study, they declared their willingness to participate in the study. Acceptance was provided online.

## **Consent for publication**

The study participants were informed that finding of the study would published. Identifying images or clinical details of participants that compromise anonymity were not applicable in this manuscript.

## **Competing interests**

The authors declare that they have no competing interests.

## **Author details**

Siedlce University of Natural Sciences and Humanities, Faculty of Medical and Health Sciences

## **References**

1. Warburton DER, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. *Can Med Assoc J.* 2006; doi: 10.1503/cmaj.051351.
2. Rhodes RE, Bredin SSD, Janssen I, Warburton DER, Bauman A. Physical activity: Health impact, prevalence, correlates and interventions. *Psychol Health.* 2017; doi: 10.1007/s10865-009-9237-0.

3. Gillison FB, Skevington SM, Sato A, Standage M, Evangelidou S. The effects of exercise interventions on quality of life in clinical and healthy populations: a meta-analysis. *Soc Sci Med*. 2009; doi: 10.1016/j.socscimed.2009.02.028.
4. Rebar A, Stanton R, Geard D, Short CE, Duncan M, Vandelanotte C. A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. *Health Psychol Rev*. 2015; doi: 10.1080/17437199.2015.1022901.
5. Kohl HW, Craig CL, Lambert EV, Inoue S, Alkandari JR, Leetongin G, Kahlmeier S. The pandemic of physical inactivity: global action for public health. *Lancet*. 2012; 380(9838):294–305.
6. Spence JC, Blanchard CM, Clark M, Plotnikoff R, Storey KE, McCargar L. The role of self-efficacy in explaining gender differences in physical activity among adolescents: a multi-level analysis. *J Phys Act Health*. 2010; doi: 10.1123/jpah.7.2.176.
7. Ilesanmi-Oyelere BL, Nicole C, Roy NC, Coad J, Kruger MC. Associations between self-reported physical activity, heel ultrasound parameters and bone health measures in post-menopausal women. *J. Environ. Res. Public Health*. 2019; doi: 10.3390/ijerph16173177.
8. Warburton DER, Bredin SSD. Reflections on physical activity and health: what should we recommend ? *Can J Cardiol*. 2016; doi: 10.1016/j.cjca.2016.01.024.
9. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U. Global physical activity levels: surveillance progress, pitfalls and prospects. *Lancet*. 2012; doi: 10.1016/S0140-6736(12)60646-1.
10. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 2012; doi:10.1016/S0140-6736(12)61031-9.
11. Saunders J, Hume C, Timperio A, Salmon J. Cross-sectional and longitudinal associations between parenting style and adolescent girls' physical activity. *Int J Behav Nutr Phys Act*. 2012;9:141.
12. Garcia Bengoechea E, Ruiz Juan F, Bush PL. Delving into the social ecology of leisure-time physical activity among adolescents from south eastern Spain. *J Phys Act Health*. 2013;10(8):1136-1144.
13. Mailey EL, McAuley E. Impact of a brief intervention on physical activity and social cognitive determinants among working mothers: a randomized trial. *J Behav Med*. 2014; doi: 10.1007/s10865-013-9492-y.
14. Beenackers MA, Kamphuis CB, Giskes K, Brug J, Kunst AE, Burdorf A, van Lenthe FJ. Socioeconomic inequalities in occupational, leisure-time, and transport related physical activity among European adults: a systematic review. *Int J Behav Nutr Phys Act*. 2012;9(1):1-23.
15. Hoebel J, Fingerm JD, Kuntz B, Lampert T. Sozioökonomische Unterschiede in der körperlich-sportlichen Aktivität von Erwerbstätigen im mittleren Lebensalter. 2016;59:188–196.
16. Hull EE, Rofey DL, Robertson RJ, Nagle EF, Otto AD, Aaron AJ. Influence of marriage and parenthood on physical activity: a two-year prospective analysis. *J Phys Act Health*. 2010; doi: 10.1123/jpah.7.5.577.
17. Bryan S, Walsh P. Physical activity and obesity in Canadian women. *BMC Women's Health*. 2004; 4 Suppl 1:6.

18. Borodulin K, Evenson KR, Herring AH. Physical activity patterns during pregnancy through postpartum. *BMC Women's Health*. 2009; doi:10.1186/1472-6874-9-32.
19. Bellows-Riecken KH, Rhodes RE. A birth of inactivity? A review of physical activity and parenthood. *Prev Med*. 2008; doi: 10.1016/j.ypmed.2007.08.003.
20. Rhodes RE, Quinlan A. Predictors of physical activity change in observational designs. *Sports Med*. 2015; doi: 10.1007/s40279-014-0275-6.
21. Pollman-Schult M. Parenthood and life satisfaction: why don't children make people happy? *J Marriage Fam*. 2014; doi: 10.1111/jomf.12095.
22. Candelaria JI, Sallis JF, Conway TL, Saelens BE, Frank LD, Slymen DJ. Differences in physical activity among adults in households with and without children. *J Phys Act Health*. 2012; doi: 10.1123/jpah.9.7.985.
23. Viswanath K. Perspectives on models of interpersonal health behavior. In: Glanz K.; Rimer BK, Viswanath K. editors. *Health behavior and health education: Theory, research and practice*. San Francisco, CA: Jossey-Bass. 2008; 271-285.
24. Nelson NM, Wright A, Lowry RG, Mutrie N. Where is the theoretical basis for understanding and measuring the environment for physical activity? *Health Insights*. 2008;2:111-116.
25. Frost SS, Goins RT, Hunter RH, Hooker SP, Bryant LL, Kruger J, Pluto D. Effects of the built environment on physical activity of adults living in rural settings. *Am J Health Promot*. 2010;24:267-283.
26. Yousefian A, Ziller E, Swartz J, Hartley D. Active living for rural youth: Addressing physical inactivity in rural communities. *J Public Health Manag Pract*. 2009;15:223-231.
27. Statistics Poland, Department of Demographic and Labor Market Studies, Basic information on demographic development of Poland until 2018.
28. Biernat E. International physical activity questionnaire – polish long version. *Pol J Sports Med*. 2013; 29(1):1-5.
29. Fogelholm M, Malmberg J, Suni J, Santtila M, Kyröläinen H, Mäntysaari M, Oja P. International physical activity questionnaire: Validity against fitness. *Med Sci Sports Exerc*. 2006;38(4):753-760.
30. Parks SE, Housemann RA, Brownson RC. Differential correlates of physical activity in urban and rural adults of various socioeconomic backgrounds in the United States. *J Epidemiol Community Health*. 2003; doi:10.1136/jech.57.1.29.
31. Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJ, Martin BW. Correlates of physical activity: why are some people physically active and others not? 2012; 380(9838):258–271.
32. Woolf K, Reese CE, Mason MP, Beard LC, Tudor-Locke C, Vaughan LA. Physical activity is associated with risk factors for chronic disease across adult women's life cycle. *J Am Diet Assoc*. 2008; doi:10.1016/j.jada.2008.03.015.
33. Dziewaltowski DA, Ryan GJ, Rosenkranz RR. Parental bonding may moderate the relationship between parent physical activity and physical activity after school. *Psychol Sport Exerc*.

- 2008;9(6):848-854.
34. Madsen KA, McCulloch CE, Crawford PB. Parent modeling: Perceptions of parents physical activity predict girls activity throughout adolescence. *J Pediatr.* 2009; doi:10.1016/j.jpeds.2008.07.044.
  35. del Mar Bibiloni M, Pich J, Córdova A, Pons A, Tur JA. Association between sedentary behaviour and socioeconomic factors, diet and lifestyle among the Balearic Islands adolescents. *BMC Public Health.* 2012;12:718.
  36. Telama R, Yang X, Viikari J, Valimaki I, Wanne O, Raitakari O. Physical activity from childhood to adulthood: A 21-year tracking study. *Am J Prev Med.* 2005;28(3):267-273.
  37. Machado-Rodrigues AM, Coelho ESMJ, Mota J, Padez C, Martins RA, Cumming SP, Riddoch C, Malina RM. Urban–rural contrasts in fitness, physical activity, and sedentary behaviour in adolescents. *Health Promot Int.* 2014;29(1):118-129.
  38. Rhodes RE, Naylor PJ, McKay HA. Pilot study of a family physical activity planning intervention among parents and their children. *J Behav Med.* 2010; doi: 10.1007/s10865-009-9237-0.
  39. Arab-Moghaddam N, Henderson KA, Sheikholeslami R. Women's leisure and constraints to participation: Iranian perspectives. *J Leisure Res.* 2007;39(1):109-126.
  40. Miller YD, Brown WJ. Determinants of active leisure for women with young children - an "Ethic of Care" prevails. *Leis Sci.* 2005; doi:1080/01490400500227308.
  41. Lombard C, Deeks A, Ball K, Jolley D, Teede H. Weight, physical activity and dietary behavior change in young mothers: short term results of the HeLP-her cluster randomized controlled trial. *Nutr J.* 2009; doi: 10.1186/1475-2891-8-17.
  42. Barkin JL, Wisner KL. The role of maternal self-care in new motherhood. 2013; doi:10.1016/j.midw.2012.10.001.
  43. Eyler AA, Vest JR. Environmental and policy factors related to physical activity in rural white women. *Women Health.* 2002;36(2):111-121.
  44. Pope CJ, Mazmanian D. Breastfeeding and postpartum depression: an overview and methodological recommendations for future research. *Res. Treat.* 2016; doi: 10.1155/2016/4765310.
  45. Ankoye R, Acheampong E, Budu-Ainooson A, Obeng EI, Akwasi AG. Prevalence of postpartum depression and interventions utilized for its management. *Gen. Psychiatry.* 2018; doi: 10.1186/s12991-018-0188-0.
  46. Christopher K. Extensive mothering: Employed mothers' constructions of the good mother. *Gender & Society* 2012;26:73-96.
  47. Rhodes RE, Blanchard CM, Benoit C, Naylor PJ, Levy-Milne R, Warburton DER, Symons Downs D. Belief-level markers of physical activity among young adult couples: comparisons across couples without children and new parents. *Psychol Health.* 2014; doi: 10.1080/08870446.2014.929687.
  48. Adachi-Mejia AM, Drake KM, MacKenzie TA, Titus-Ernstoff L, Longacre MR, Hendricks KM, Beach ML, Dalton MA. Perceived intrinsic barriers to physical activity among rural mothers. *J Womens Health (Larchmt).* 2010; doi:10.1089/jwh.2009.1879.

49. Craig L, Mullan K. Parenthood, gender and work-family time in the United States, Australia, Italy, France, and Denmark. *J Marriage Fam* 2010;72:1344-1361.
50. Esteban-Cornejo I, Hallal CP, Mielke IG, Menezes AMB, Goncalves H, Wehrmeister F, Ekelund ULF, Rombaldi AJ. Physical activity throughout adolescence and cognitive performance at 18 years of age. *Med Sci Sports Exerc.* 2015;47(12):2552-7.
51. Hesketh KR, Goodfellow L, Ekelund U, McMinn AM, Godfrey KM, Inskip HM, Cooper C, Harvey NC, van Sluijs EM. Activity levels in mothers and their preschool children. 2014; doi:10.1542/peds.2013-3153.
52. Lackman J, Smith ML, McNeill EB. Freshman college students' reasons for enrolling in and anticipated benefits from a basic college physical education activity course. *Front Public Health.* 2015; doi:3389/fpubh.2015.00162.