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Leisure-time physical activity during the COVID-19 pandemic in the family context

Abstract. The study focused on the involvement of children and adults in family leisure activities during pandemic-related lockdowns in relation to the WHO's recommendations regarding physical activity. The study is based on data collected from adolescents ($n = 89$) and their parents ($n = 73$) selected from among inhabitants of Poznan and its neighbouring areas. Physical activity levels were determined using a Physical Activity Screening Measure. The results suggest a negative impact of the pandemic on leisure physical activity undertaken by members of the surveyed families. In order to effectively monitor the effects of the pandemic on family physical activity, it is necessary to develop experimental projects in the form of interventional programs.

Keywords: leisure, physical activity, family, pandemic

JEL Codes: I12; J13

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1. Introduction

Leisure is an important source of family cohesion, with the family being the first and most important educational environment for both parents and children (Crawford, Jackson, & Godbey, 1991). Studies of family leisure have consistently

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demonstrated a positive relationship between family recreation and aspects of family functioning such as satisfaction and bonding. It has been suggested that in modern society leisure is the single most important force contributing to the development of cohesive, healthy relationships between husbands and wives and between parents and their children, yet the nature of family leisure relationships remains poorly understood. Leisure-time physical activity (LTPA) is essential for health and is one of the most important components of total physical activity (PA) (Badicu & Campa, 2021; Fleming & Cavanagh, 2012; Pluta et al., 2020; Sallis, Prochaska, & Taylor, 2000). The World Health Organization (WHO) defines PA as “any bodily movement produced by skeletal muscles that requires energy expenditure” (World Health Organization, 2020a). PA refers to all movement including movement during leisure time, commuting, or work involving PA. Both moderate- and high-intensity PA improves health. WHO recommends that children and adolescents aged 5-17 should engage in at least 60 minutes of moderate to vigorous intensity physical activity a day. Adults aged 18-64 years should do at least 150-300 minutes of moderate intensity aerobic PA, or at least 75-150 minutes of vigorous aerobic PA, or an equivalent combination of moderate and vigorous activity throughout the week. Adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on two or more days a week, as these provide additional health benefits (World Health Organization, 2020a).

LTPA is a cornerstone of health and well-being. Availability of safe, accessible, and fun options for PA is essential to ensure positive health outcomes for the nation's children, adolescents and their parents. With supportive environments, all family members can be active in schools, childcare and early childhood education settings, afterschool programs, and communities. LTPA levels vary depending on the socioeconomic status, which is particularly important in the context of families. Children with parents who have lower incomes tend to spend more time engaged in sedentary behaviours, such as watching television. They also have lower non-school physical activity levels than children whose parents have higher median incomes. These patterns reflect disparities in the environment, such as insufficient facilities, lack of interventional programmes, and safety concerns.

A number of researchers believe that strong social ties are the main determinant of LTPA in families (Bauer et al., 2008; Erkelenz et al., 2014; Pluta et al., 2017; Wu et al., 2020). The most important sources of support are natural and non-institutional, such as family, friends and social groups one is a member of. Scientists from many countries have observed a positive relationship between family involvement in leisure time and important aspects of the modern family (including Zabriskie & McCormick, 2003; Zabriskie, Aslan, & Williamson, 2018). However, environmental, cultural and social traditions are important variables that should be taken into account when explaining the phenomenon of family leisure time. There are

reasons to assume that these variables can significantly shape individual and group values, attitudes, tendencies and behaviours of family members in their leisure time. Regular LTPA, especially during the COVID-19 pandemic, have been shown to counteract diabetes and obesity, reduce hypertension and the risk of cardio-vascular diseases and some cancers as well as provide other health benefits (Chen et al., 2020; Hudson & Sprow, 2020; Trost et al., 2001). If children are to lead a physically active lifestyle, parents' involvement and support (in the case of adolescents) are essential (Edwardson & Gorely, 2010; Mactavish & Schleien, 2004; Ortega et al., 2008). Physical distancing measures during the COVID-19 pandemic have dramatically altered adolescents' and parents' opportunities to be physically active.

The COVID-19 pandemic has caused a significant disruption in the lives of millions of people, including children, adolescents, and adults. It has affected social activities and public life around the globe with Poland being no exception. The COVID-19 pandemic highlights the growing problem of PA deficiency and indicates a strong relationship with non-communicable diseases (NCDs) (Zhang, 2020). Lockdowns imposed by national governments have been particularly frustrating for the physically active part of the population who have been forced to reduce their daily PA. For children and teenagers, PA is closely linked with school-related activities, active transport, and participation in sports. With the closure of schools during the COVID-19 pandemic and physical education classes becoming inaccessible following the switch to online teaching, PA in the population could be further compromised. All in all, the COVID-19 pandemic has changed the way people approach PA. Many researchers have pointed to a decrease in PA levels due to social distancing measures and the fact that PA may help reduce the mental health burden associated with the COVID-19 outbreak (Caputo & Reichert, 2020; Drygas, Zdrojewska, & Gajewski, 2021).

In particular, the COVID-19 pandemic and the associated restrictions have brought about substantial psychosocial effects, for example an increased prevalence of anxiety and stress (Salari et al., 2020), which PA is known to ameliorate (Stubbs et al., 2017). Consequently, researchers have emphasized the importance of being physically active during the pandemic (Chen et al., 2020; Hudson & Sprow, 2020; Lippi, Henry, & Sanchis-Gomar, 2020; Ricci et al., 2020; Sallis et al., 2020). In 2020, studies from different countries (e.g., Belgium, Canada, Greece, USA, Australia) analyzed changes in PA behavior as a result of various COVID-19 restrictions introduced by their governments. PA was shown to be lower during COVID-19 restrictions compared to the time before restrictions were put in place (López-Bueno, Calatayud, & Ezzatvar, 2020; Mutz & Gerke, 2020; Schnitzer et al., 2020; Stanton et al., 2020).

The aim of this study is to determine the level of PA undertaken by members of families from Poznań during the COVID-19 pandemic. The study was intended to verify the following research hypotheses:

1. The level of PA in families does not meet the recommended WHO criteria. Sedentary activities predominate among the subjects.
2. There is a relationship between parental support and the level of LTPA undertaken in the family during the pandemic.

2. Materials and methods

2.1. Participants

A non-probability sample of respondents was selected using the following criteria: the form of custody over the child (families), the age of children (over 10), and the place of residence. The survey was conducted between September 2020 and April 2021. All participants were informed about the study's aims, risks and benefits, and parental consent was obtained with respect to adolescent participants.

89 children aged 10 or older (53 girls, aged $M = 14.8 \pm 2.58^1$ years, and 36 boys, aged $M = 14.1 \pm 2.524$) from 73 families living in the city of Poznan and its neighbouring area participated in the study. The group of parents included 73 respondents (64 mothers aged $M = 56.2 \pm 12.9$ years and 9 fathers, aged $M = 62.8 \pm 7.2$ years).

Most of the parents had vocational education, and only 15% had higher education. The majority of families lived in Poznań (72%), while the rest in smaller towns or rural areas. The responding parents were classified into socio-economic groups, based on their social economic status (Baker, 2014). The highest socio-economic status was assigned to a group of highly qualified professionals, the lowest – to employees performing simple work. There was also a group of economically inactive parents (retired, studying or taking care of their home). The majority of adolescent respondents were economically inactive (53%), while the rest worked as technical staff, were employed in services, or performed simple work. 40% of adolescent respondents attended elementary school (40%) and lived in Poznań (70.8%), while 10% lived in rural areas.

2.2. The research procedure

Two questionnaires were used to measure factors associated with leisure-time activity in families. The first one was addressed to parents, the second was administered to children in the sampled families. The questionnaires were prepared on

¹ Mean \pm SD

the basis of the Health Behaviour in School-Aged Children (HBSC) questionnaire (Currie et al., 2008; Mazur & Małkowska-Szkućnik, 2018). The questionnaire for parents consisted of 37 questions about demographic variables and ways of organizing leisure time in the family, the level of PA, as well as the external sources of financing used for this purpose. The questionnaire for children consisted of 51 questions concerning the family structure, amount of time spent together, physical and sedentary activities. There were also questions about forms of physical and cultural activity, entertainment and creative recreation, as well as extracurricular activities undertaken by the respondents. Both questionnaires were tested during a pilot study.

In order to determine the level of PA undertaken by family members and the level of sedentary activity, the following indicators were used: MVPA (Moderate to Vigorous Physical Activity), VPA (Vigorous Physical Activity), with a distinction between VPA1 (i.e. frequency – number of days) and VPA2 (intensity – number of hours) (Prochaska, Sallis, & Long, 2001). The main reason for using these measures was their ease of application in lockdown conditions, when all students were obliged to work remotely from home. In addition, this measure was also used in an earlier study in Poland (Bronikowska et al., 2021). In general, these measures are used to count the average number of days per week when respondents reported having spent at least 60 minutes doing various forms of PA and observed an increased heart rate or experienced a feeling of shortness of breath (higher breathing frequency). Children and their parents were asked to provide a truthful response to the following questions:

Q1: Over the past 7 days, on how many days have you been physically active for a total of at least 60 min per day?

Q2: Over a typical week, on how many days are you physically active for a total of at least 60 min per day?

Answers to these questions were used to calculate an MVPA index according to the formula originally presented by Prochaska, Sallis and Long (2001): $MVPA = (Q1 + Q2)/2$, where $MVPA = PA$ index; $Q1 =$ number of physically active days during the past 7 days; $Q2 =$ number of physically active days during a typical week. Two questions were used to determine VPA: Q1. How often do you usually do after-school physical when exercise vigorously enough to experience shortness of breath or sweating? The following response options could be chosen: daily (7), 4-6 times a week (6), 2-3 times a week (5), once a week (4), once a month (3), less than once a month (2), never (1) (VPA1). Q2. How many hours of your after-school leisure time per week do you usually spend exercising vigorously enough to experience shortness of breath or sweating? The following response options could be chosen: I do not exercise at all (1), about half an hour a day (2), about 1 hour (3), about 2-3 hours (4), about 4-6 hours (5), 7 hours and more (6) (VPA2).

Numerical values assigned to the responses (in brackets) were used to calculate the overall PA index for each respondent (the index of general physical activity). The combined score for the four questions was divided by the maximum number of points that could be scored for each question. The resulting index was multiplied by 100 to obtain a standardized score.

In addition, the Body Mass Index (BMI) (Cole & Lobstein, 2012) was calculated for all adolescent respondents, who were also asked to assess their family's wealth (Perceived Family Wealth) on a 5-point scale: very rich, rather rich, average, rather poor, very poor (Mazur & Woynarowska, 2004).

When analysing initiatives regarding the planning of leisure time in the studied families, attention was also paid to family relations and parental support given to children. The perceived level of this support was assessed using the Perceived Social Support Scale – Family Subscale (Canty-Mitchell & Zimet, 2000; Pluta et al., 2020; Zimet et al., 1988). In the questionnaire children were asked to indicate to what extent they agreed with the following sentences: “My family tries to help me very much”; “My family gives me the emotional help and support I need”; “My family is happy to help me make my own decisions”; “I can talk about my problems with my family”. In the actual study, a revised version of the questionnaire was used, which included an introductory note explaining that parental support refers only to matters related to of family recreational physical activity. The respondents answered on a 5-point Likert scale ranging from “I completely disagree” to “I completely agree” (Cheng & Chan, 2004; Nakigudde et al., 2009). Using the numerical values (0 – completely disagree, 4 – completely agree) assigned to each option, a standardized score ranging from 0-100 was calculated (by adding points obtained by each responding adolescent and dividing them by the maximum number of points and multiplying by 100). The results were interpreted as follows: a score between 0 and 65 represented a poor level of perceived support, 66-85 – a medium level of support, and 86-100 – a high level of support (Mazur, 2013).

2.3. Statistical tests

The following statistical tests were used to evaluate the relationship between the variables: the significance of differences between two rank or quantitative variables was tested using the Mann-Whitney U test; the significance of differences between more than two mean values was checked using the Kruskal-Wallis test; the significance of differences between qualitative (nominal) variables was verified using the chi square test of independence. Correlations between the variables were tested using the Spearman's rank correlation coefficient. All tests were performed at the significance level of $p = 0.05$. The calculations were made with the SPSS software.

2.4. Ethical considerations

The survey was conducted in compliance with the Declaration of Helsinki and was approved by the local ethics committee (No. 1075/15). The survey protocol was also approved by the Board of Ethics of Poznan University School of Physical Education. Participation in the survey was voluntary, and respondents were informed that they were free to refuse to talk about particular topics or to end their interview at any time. Confidentiality was maintained by using pseudonyms and changing identifying information. Participants were offered a copy of the final research report.

3. Results

3.1. The level of PA reported by family members

The mean value of the MVPA index in the group of parents was 2.9 ± 2.54 (3.0 ± 2.54 for women, 2.0 ± 2.45 for men). 24.6% of the parents did not undertake at least 60 minutes of moderate PA on any of the last seven days. 52% of the parents spent three days a week (MVPA = 3) doing moderate PA. 39% of respondents engaged in moderate PA five days a week (MVPA = 5); this level of PA was reported by 42% of female parents and 14% of male parents. Only 12% of parents undertook moderate PA every day within the last seven days. The results are presented in Table 1.

The recommendation to engage in physical activity at least twice a week, for at least two hours, was met by only 10% of parents, all of whom were women. The mean value of the general index of PA for the parents was 33 ± 26.86 points (Table 2).

Table 1. Parents who spent the recommended amount of time doing moderate physical activity (MVPA)

Parents	MVPA = 3		MVPA = 5		MVPA = 7	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Total	36	52.2	27	39.1	8	11.6
Women	34	54.8	26	41.9	7	11.3
Men	2	28.6	1	14.3	1	14.3

Source: author's own research.

Table 2. The index of general physical activity for the parents

Parents	Mean	SD*	Median	Mode	Min.	Max.
Total	33.0	26.86	33.3	0.0	0.0	94.4
Women	33.6	26.81	30.6	0.0	0.0	94.4
Men	27.8	28.87	33.3	33.3	0.0	83.3

* SD – standard deviation

Source: author's own research.

Statistical analysis did not show any significant relationships between the level of PA and the parents' BMI index. Similarly, so significant relationships were observed between the occurrence of overweight and obesity and the fact of engaging in moderate and vigorous physical activity according to the recommended criteria, or between the values of the MVPA, VPA indices and the index of general physical activity.

Less than 50% of adolescent respondents spent the recommended amount of time doing moderate physical activity, i.e. at least 60 minutes five days a week (Table 3).

Vigorous PA was undertaken every day by 15% of the adolescents in the survey. 51% of them engaged in vigorous exercise at least twice a week, 32% exercised at least four times a week.

Less than 30% of adolescent respondents engaged in moderate or vigorous physical activity with the recommended frequency, i.e. at least twice a week for at least 2 hours.

The mean value of the general index of PA for adolescent respondents was 52 ± 23.94 points. Higher index values were recorded for boys (58.8 points) than for girls (47.4 points) (Table 4).

Table 3. Adolescent respondents who spent the recommended amount of time doing moderate activity [%]

Adolescent respondents	MVPA = 5	MVPA = 7
Total	45	18
Girls	42	13
Boys	50	25
Respondents aged 10-15	51	24
Respondents older than 15	37	11

Source: author's own research.

Table 4. The index of general physical activity for adolescent respondents

Adolescent respondents	Mean	SD*	Median	Mode	Min.	Max.
Total	52.0	23.94	55.6	38.9	0.0	100.0
Girls	47.4	21.17	44.4	38.9	5.6	88.9
Boys	58.8	26.37	61.1	38.9	0.0	100.0
Respondents aged 10-15	51.9	24.94	55.6	38.9	0.0	100.0
Respondents older than 15	52.2	22.87	52.8	44.4	5.6	94.4

* SD – standard deviation

Source: author's own research.

Regardless of age, most adolescent respondents had normal body weight. In the group of younger children, less than 10% were underweight, 19.6% were overweight, and 3.9% were obese. Among older children, body weight deficiency was observed for 21.1% of the respondents, overweight for 13.2%, and obesity for 2.6%.

The analysis showed statistically significant relationships between the children's BMI and their reported level of moderate PA. High values of the MVPA index correlated with higher values of the BMI ($p = 0.033$), which means that children with higher BMI were more likely to undertake moderate PA. Significant relationships were not observed with regard to vigorous PA or children's sex (Table 5).

Statistical analysis showed no statistically significant relationship between the prevalence of overweight and obesity in children and the values of the MVPA, VPA indices and the index of general PA. Statistically significant correlations were observed between the nutritional status and the fact of engaging in moderate PA every day (MVPA = 7). The largest number of children who met this recommendation had normal body weight, followed by overweight (Table 6).

Table 5. The relationship between children's BMI and their level of physical activity

BMI \ PA indicators	Correlation coefficient	Significance (two-sided)
MVPA	0.23	0.033
VPA1	-0.06	0.601
VPA2	0.06	0.589
General PA index	0.11	0.311

Source: author's own research.

Table 6. The relationship between the fact of engaging in daily moderate PA and the IOTF BMI cut-offs

Respondents' weight category	Number and percentage of respondents	
	who did not engage in daily moderate PA	who engaged in daily moderate PA
Underweight	13 17.8%	0 0.0%
Normal body weight	50 68.5%	8 50.0%
Overweight	8 11.0%	7 43.8%
Obesity	2 2.7%	1 6.3%
Chi square test of independence	$\chi^2 = 12.39; p = 0.006$	

Source: author's own research.

Another aspect analysed in the study was the relationship between the levels of PA for the parents and their children. A statistically significant relationship was found between values of the VPA2 index for parents and values of the MVPA index for their children. In other words, parents who spent more hours doing vigorous PA had children with higher values of the MVPA index (Table 7).

Table 7. The relationship between children's level of PA (by sex) and their parents' level of PA

Children \ Parents		Correlation coefficient			Significance (two-sided)		
		MVPA	VPA1	VPA2	MVPA	VPA1	VPA2
Girls	MVPA	0.13	0.33	0.29	0.378	0.018	0.045
	VPA1	-0.05	-0.02	0.04	0.721	0.864	0.796
	VPA2	0.08	0.01	0.06	0.573	0.918	0.661
Boys	MVPA	0.14	0.05	0.09	0.437	0.791	0.599
	VPA1	-0.19	-0.09	-0.03	0.282	0.625	0.874
	VPA2	-0.09	-0.08	0.05	0.608	0.643	0.765

Source: author's own research.

3.2. Parental support regarding the planning of children's leisure time activity

As regards parental involvement in the planning of their children's leisure time in the surveyed families, it was found that almost half of the children (47%) reported receiving a high level of support from their parents, 36% reported an average level of support, and the remaining 17% assessed the level of support as poor. The statistical analysis revealed that the more parental support a child received, the more likely he or she was to participate with their parents in almost all the leisure activities listed. These results were found to be statistically significant (Table 8).

Table 8. The relationship between leisure activities undertaken by the family and perceived social support received by children

Activities	Correlation coefficient	Significance (two-sided)
We watch TV or movies together	-0.32	0.002
We eat meals together	-0.32	0.002
We play games at home	-0.31	0.003
We go for walks together	-0.36	0.001
We visit different places together	-0.29	0.006
We visit relatives and friends together	-0.21	0.051
We play sports together	-0.23	0.032
We sit and talk together	-0.31	0.003

Source: author's own research.

4. Discussion

The aim of this study was to analyse the level of PA in members of Polish families during lockdown. It was hypothesised that the level of PA in families during the pandemic was below that recommended by WHO and that the respondents would report high levels of sedentary behaviour. Average values of the MVPA index calculated for the parents in general and for female parents correspond to the criterion of moderate PA undertaken 3 days a week.

The results presented in the study confirm the existence of relationships between the parents' level of PA, as measured by the VPA index, and their engagement in certain forms of physical recreation. No statistically significant relationships were found between the parents' BMI and their level of PA.

The mean value of the MVPA index in the group of adolescent respondents was 4 days. The latest research by HBSC (Bronikowska et al., 2021; Mazur & Małkowska-Szcutnik, 2018) indicates that only a small percentage of teenagers in Poland engage in physical activity, either moderate or vigorous, with the recommended frequency. The frequency of PA in the HBSC study was found to be significantly related to the sex and age of the adolescent respondents. Recommended frequency of moderate PA (MVPA) was reported by only 17.2%, which is 7 percentage points fewer than in the previous round of the HBSC survey conducted in 2014. In the 2014 survey, MVPA at the recommended level was undertaken by almost 5% more boys than girls. The number of teenagers who engaged in daily PA was found to decrease with age. Intensive PA, in accordance with WHO recommendations (at least 4 times a week), was undertaken by a third of the respondents. The percentage of adolescents who were physically active with the recommended frequency also decreased with age. Girls tend to fare worse than boys, not only in Poland but also in the USA (Davison & Jago, 2009), and this unfavourable pattern tends to strengthen with age. Moreover, more than two thirds of young people in Europe may not have enough physical activity (Dumith et al., 2011; Exel et al., 2018).

Data collected in the survey described in the article provided interesting insights about relationships between the level of PA undertaken by children and their parents. Children whose parents engaged in more vigorous PA were more likely to engage in moderate PA. Higher values of the MVPA index were calculated for girls whose parents engaged in vigorous PA more frequently.

The author assumed that parents were the main initiators of leisure activities undertaken in families during the pandemic period. Parents' levels of LTPA are generally believed to be among the strongest determinants of their children's physical activity. Several studies of school-aged children, based on self-reporting or parental reporting of PA have found positive correlations between LTPA of family members (Griffith et al., 2007; Welk, Wood, & Morss, 2003). Parents play an important role in shaping children's health behaviours and can do so by setting a good example (i.e. engaging in LTPA behaviours observed by children – doing things together), which increases the likelihood that children will emulate their parents' actions (Griffith et al., 2007; Tate et al., 2015; Trost et al., 2003; Trost, McIver, & Pate, 2005). On the other hand, parents can also be the primary inhibitors of their children's participation in LTPA (Beets, Cardinal, & Alderman, 2010), and there are a number of direct and indirect ways in which they can reinforce their children's negative patterns of leisure-time behaviours (Cheatom, 2014). All of the parents in the survey claimed that they encouraged their children to participate in their leisure time activities. Adolescent respondents' scores on the Perceived Social Support Scale revealed a correlation between the amount of support received from the parents and children taking up leisure time activities. Children who felt

a higher level of support in the family were significantly more likely to participate in almost all activities undertaken by their parents/the rest of the family. While parents can be viewed as initiators of leisure time activities, children's involvement in leisure activities depends on the level of family support they experience. Studies by Wilson and Dollman (2007) and World Health Organization (2020b, c) show that the fact of parents engaging in PA together with their adolescents has a considerable impact on the level of LTPA undertaken by adolescents.

This study is not without certain limitations. The main one is the relatively small number of respondents who agreed to participate in the survey. Moreover, although our PA data were collected using a validated questionnaire, they were self-reported. However, they were found to be consistent with data collected using other research tools.

5. Conclusions

The results of the study described in the article suggest that parents need to make a greater effort to motivate young people to take up PA and support them in their activities, especially during lockdowns. To prevent any further decline in the level of PA undertaken by young people and their parents, a supportive environment around PA must be created. The findings from this study suggest that any future interventional projects regarding LTPA undertaken by children should include the family as an important source of social support in the promotion of general PA. Future research should focus on a longitudinal validation of the casual relationships observed in the presented study. Also, the reported findings should be verified through representative surveys involving bigger samples.

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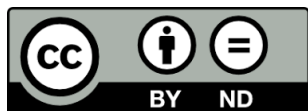
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Rekreacyjna aktywność fizyczna w rodzinie w czasie pandemii COVID-19

Streszczenie. Badania zostały przeprowadzone z perspektywy dzieci i dorosłych w kontekście podejmowania rodzinnych zajęć rekreacyjnych podczas pandemii COVID-19, w odniesieniu do spełnienia zaleceń Światowej Organizacji Zdrowia w zakresie aktywności fizycznej. Grupa badana składała się z młodzieży ($n = 89$) i rodziców ($n = 73$) pochodzących z miasta Poznania i okolic. Poziomy aktywności fizycznej określano za pomocą miary przesiewowej zwanej miarą przesiewową aktywności fizycznej. Uzyskane wyniki pokazują negatywny wpływ pandemii na aktywność fizyczną w czasie wolnym podejmowaną przez członków badanych rodzin. Istnieje potrzeba opracowania eksperymentalnych projektów w postaci programów interwencyjnych, aby skutecznie monitorować wpływ pandemii na aktywność fizyczną rodzin.

Słowa kluczowe: rekreacja, czas wolny, aktywność fizyczna, rodzina, pandemia



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