



## RELATIONSHIP BETWEEN QUALITY OF LIFE AND LEVEL OF PHYSICAL ACTIVITY AND FAMILY WELL-BEING

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### Abstract

**Study purpose.** The objective of the study was to assess the relationship between quality of life and physical activity level and family well-being.

**Materials and Methods.** The International Physical Activity Questionnaire (IPAQ) was used to assess parental physical activity. The quality of life was assessed with the Short Form (SF-36) Health Survey Questionnaire. The data obtained were processed using cluster and correlation analysis, and descriptive statistics. The study involved 106 young adults (married couples), who were parents of preschool and primary school-aged children.

**Results.** An assessment of parental physical activity showed that 62.3% of the respondents had a low level of physical activity and 37.7% had a moderate level, whereas no individuals with a high level of physical activity were found. Families with children were divided into clusters with the k-means method according to the level of physical activity: Cluster 1 included families with a low level of physical activity; and Cluster 2 included the families with a moderate level of physical activity. The results of the study confirmed the relationship between the quality of life and the level of physical activity and family well-being. It was found that all the quality of life components of the study participants with a moderate level of physical activity are significantly higher ( $p < 0.05$ ) than those of the participants with a low level of physical activity. Correlation analysis of family well-being and quality of life indicators revealed significant relationships ( $p < 0.05$ ) between physical functioning, physical role functioning, vitality, and mental health.

**Conclusions.** The direct statistically significant relationship between family well-being score and quality of life components of the respondents was demonstrated.

**Keywords:** health-enhancing physical activity, quality of life, family well-being, active leisure, parents, children.

### Introduction

The issue of population health promotion and maintenance is the main economic, social, and political challenge for the state. According to sociological surveys, only 15% of Ukrainians consider themselves healthy (Andrieieva et al., 2020; Yelizarova et al., 2020). Every year, the percentage of sedentary people who do not meet the recommended level of regular physical activity is increasing (Guthold et al., 2020). As noted by the WHO, physical inactivity ranks fourth among the factors that are responsible for premature

mortality of people on a global scale (Bull et al., 2020). Due to a significant number of the population that is not involved in health-enhancing and recreational physical activity in conjunction with ignoring other components of a healthy lifestyle, Ukraine has one of the worst indicators of the average duration and quality of life of people in Europe (Andrieieva et al., 2020). Therefore, it is necessary to implement various programs aimed at overcoming this social challenge. It is worth noting that the development and implementation of measures to improve the quality of life are fully consistent with the European and global trends of population involvement in physical activity. In Ukraine, over the past 20 years, the measures have been taken to increase the number of the population involved in physical activity during leisure time (Andrieieva et al., 2022). The researchers are currently in an

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active search for a solution to the challenges of introducing health-enhancing physical activity during the organization of family leisure (Maltsev et al., 2022; Rodríguez-Sánchez et al., 2011; Taylor et al., 2012). At the same time, insufficient attention has been paid to the relationship between the quality of life and the level of physical activity and family well-being in scientific studies. Thus, despite close attention to family leisure research, the main studies have been focused on issues of quality of family life (for example, family satisfaction and family cohesion) and the organization of family leisure (for example, the influence of socioeconomic status on family well-being, barriers to family leisure activities, etc.), as well as assessing the relationship between family leisure patterns and family functioning (Zabriskie, 2001). A systemic analysis of the specialized literature gave us an understanding of the breadth and depth of research in the field of family leisure, but no attempts were made to quantitatively synthesize and interpret the relationships between quality of life and physical activity level and family well-being. The generalization of such results will increase the possibility of finding previously unrecognized statistically significant relationships between the studied variables and will allow them to be used as a factor of population's involvement in health-enhancing and recreational physical activity.

The objective of the study was to assess the relationship between the level of quality of life and physical activity and family well-being.

## Material and methods

### Participants

The research involved 106 families (the average age of parents was  $35.1 \pm 4.2$  years). The family structure of 95.3% participants included four people: two adults (mother and father) and two children. All the participants (parents) were asked to carefully read and sign the informed consent form, which described all stages and procedures of the study.

### Procedure

The first stage of the study included an assessment of the level of parental physical activity. Assessment was based on responses to the International Physical Activity Questionnaire (IPAQ). A version consisting of 27 items divided into five parts was used. Each part covers a specific type of activity: job-related physical activity (part 1); transportation physical activity (part 2); housework, house maintenance, and caring for family (part 3); recreation, sport and leisure-time physical activity (part 4, when answering the questions of this part of the questionnaire, those types of physical activity that the respondents already mentioned, i.e. physical activity related to job, transportation, housework, and caring for family, were not taken into account); time spent sitting or lying down (part 5, the time spent in transport was not taken into account). The IPAQ provided an opportunity to describe and analyze in detail general PA and its particular types such as leisure-time PA, home and outdoor PA, job-related PA, transportation-related PA. The structure of the IPAQ make possible to differentiate various types of activities by intensity as follows: low-intensity, moderate-intensity, and vigorous-intensity activities. An analysis of the survey results

included several stages. At the first step, energy expenditures were calculated for each type of activity taking into account the intensity of activity (low, moderate, and vigorous). At the second step, the level of total physical activity was estimated in MET-minutes per week. The total level of PA in MET-minutes per week is equal to the sum of the total amounts of each type of physical activity (job-related, transportation-related, home and outdoor PA, and leisure-time PA).

The second stage included quality of life assessment. Quality of life was assessed using the Short Form 36 (SF-36) Health Survey Questionnaire (Hagstromer et al., 2006; Lins & Carvalho, 2016). The questionnaire made it possible to assess all the components of quality of life including those related to general health status. SF-36 consists of 36 questions, which are combined into 8 scales and two summary components, and was designed to evaluate general health perceptions; limitations in physical activities because of health problems; limitations in usual role activities because of physical health problems; limitations in usual role activities because of emotional problems; limitations in social activities because of physical or emotional problems; bodily pain; vitality (energy and fatigue); and general mental health (psychological distress and well-being). The scales are constructed to measure physical and mental components of health. The answers for each item are scored on a 0 to 100 range so that a high score defines a more favorable health state. Then the items in the same scale are averaged together to create the 8 scale scores.

### Statistical analysis

Clustering by means of Data Mining was used in the study. Families with children were divided into clusters with the k-means method according to the level of physical activity (Cluster 1 included families with a low level of physical activity; and Cluster 2 included the families with a moderate level of physical activity). A normality test of the raw data using the Shapiro-Wilk test showed that they did not comply with the normal distribution. Therefore, the median (Me), 25 and 75 percentiles were used to represent the data, and Spearman's rank correlation coefficient was used for correlation analysis.

The significance level was set to  $\alpha=0.05$ . The exact p-values are given in the test, and when the p-value was less than 0.0001, it was indicated that  $p < 0.01$ . Mathematical and statistical processing of the raw data was performed using the statistical software Statistica 10.0.

## Results

According to the questionnaire results, the respondents were placed using the Categorical Score into one of the three categories: low or inactive, moderate, and high. No individuals with a high level of physical activity were identified in this study. Depending on the level of physical activity, the participants were divided into two clusters: with a low (Cluster 1) and moderate (Cluster 2) levels of physical activity. The first cluster included 66 people, and the second cluster consisted of 40 people.

To analyze the relationship between the components of the quality of life and physical activity, the respondents were assigned to two clusters on the basis of their physical activity (Table 1).

**Table 1.** Assessment of quality of life indicators in parents with different levels of physical activity (n=106)

| Quality of life components                                    | Average values, points |            |                  |             | Normality test results |                |                |                |
|---|------------------------|------------|------------------|-------------|------------------------|----------------|----------------|----------------|
|   | Cluster 1 (n=66)       |            | Cluster 2 (n=40) |             | W <sub>1</sub>         | p <sub>1</sub> | W <sub>2</sub> | p <sub>2</sub> |
|   | Me                     | 25%, 75%   | Me               | 25%, 75%    |                        |                |                |                |
| Physical functioning  | 70.0                   | 65.0; 75.0 | 85.0             | 85.0; 90.0  | 0.941                  | 0.004          | 0.796          | <0.05          |
| Role limitations due to physical health problems              | 50.0                   | 25.0; 50.0 | 75.0             | 75.0; 100.0 | 0.829                  | <0.05          | 0.797          | <0.05          |
| Bodily pain   | 52.0                   | 31.0; 52.0 | 94.0             | 87.0; 100.0 | 0.820                  | <0.05          | 0.776          | <0.05          |
| General health perceptions                                    | 35.0                   | 30.0; 42.0 | 59.5             | 45.0; 80.0  | 0.959                  | 0.028          | 0.934          | 0.021          |
| Vitality (energy and fatigue)                                 | 35.0                   | 20.0; 35.0 | 75.0             | 60.0; 85.0  | 0.912                  | <0.05          | 0.937          | 0.027          |
| Social functioning  | 37.5                   | 25.0; 50.0 | 62.5             | 62.5; 87.5  | 0.869                  | <0.05          | 0.849          | <0.05          |
| Role limitations due to personal or emotional problems        | 33.3                   | 33.3; 33.3 | 66.7             | 66.7; 66.7  | 0.466                  | <0.05          | 0.774          | <0.05          |
| General mental health (psychological distress and well-being) | 32.0                   | 32.0; 36.0 | 76.0             | 70.0; 80.0  | 0.774                  | <0.05          | 0.912          | 0.004          |

Note: Me – Median; 25%, 75% – percentiles; W<sub>1</sub>, W<sub>2</sub> – Shapiro–Wilk test values for Clusters 1 and 2, respectively; p<sub>1</sub>, p<sub>2</sub> – the achieved significance levels.

**Table 2.** Comparative analysis of quality of life indicators of the families with children who had different levels of physical activity (n=106)

| Quality of life components                                    | Calculated data |                 |       |       | p     |
|---|-----------------|-----------------|-------|-------|-------|
|   | Σr <sub>1</sub> | Σr <sub>2</sub> | U     | Z     |       |
| Physical functioning  | 2408.0          | 3263.0          | 197.0 | 7.316 | <0.05 |
| Role limitations due to physical health problems              | 2614.0          | 3057.0          | 403.0 | 5.974 | <0.05 |
| Bodily pain   | 2308.0          | 3363.0          | 97.0  | 7.968 | <0.05 |
| General health perceptions                                    | 2585.5          | 3085.5          | 374.5 | 6.159 | <0.05 |
| Vitality (energy and fatigue)                                 | 2224.0          | 3447.0          | 13.0  | 8.515 | <0.05 |
| Social functioning  | 2437.0          | 3234.0          | 226.0 | 7.127 | <0.05 |
| Role limitations due to personal or emotional problems        | 2634.5          | 3036.5          | 423.5 | 5.840 | <0.05 |
| General mental health (psychological distress and well-being) | 2245.0          | 3426.0          | 34.0  | 8.379 | <0.05 |

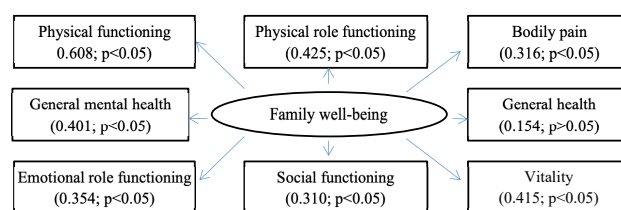
Note: Σr<sub>1</sub>, Σr<sub>2</sub> – sum of ranks for the samples Cluster 1 and Cluster 2, respectively; U – Mann-Whitney U test; Z – Z-test; p – the achieved significance level.

A comparative analysis indicated that the group of respondents who formed Cluster 2 have significantly higher values of quality of life components than the participants from Cluster 1 (p<0.05) (Table 2). Obviously, families that had a higher level of health-enhancing recreational physical activity and, accordingly, a higher level of family well-being, are also demonstrated higher values of quality of life components.

The results of correlation analysis using Spearman's rank correlation coefficient ρ confirmed the presence of direct statistically significant (p < 0.05) relationships between family well-being and quality of life components excluding general health (Fig. 1).

The families from the Cluster 2 also had higher values of physical and mental components of quality of life. Furthermore, the differences between the values of the mental component were found to be significant at p<0.05 (Table 3).

No significant differences were observed between different clusters in the values of physical component of quality of life (p > 0.05), however the mean values of the members



**Fig. 1.** Influence of family well-being on the quality of life of respondents (n=106)

of the Cluster 2 were higher compared to Cluster 1. Furthermore, the direct significant relationship between the family well-being score and quality of life components of the respondents was shown. The decreased scores of mental component in the survey participants compared to the published data, including the standardized values of the scales, can be explained by the unfavorable conditions of quarantine restrictions on the Ukrainian territories where the survey took place.

**Table 3.** Analysis of scores of quality of life components (n=106)

| Results of comparative analysis                 |                           | Quality of life components |           |           |           |
|---|---------------------------|----------------------------|-----------|-----------|-----------|
|   |                           | Physical                   |           | Mental    |           |
|   |                           | Cluster 1                  | Cluster 2 | Cluster 1 | Cluster 2 |
| Normality of distribution test                  | W                         | 0.973                      | 0.958     | 0.935     | 0.923     |
|   | p                         | 0.164                      | 0.144     | 0.002     | 0.010     |
|   | Normality of distribution | +                          | -         | +         | -         |
| Descriptive statistics                          | Me                        | 52.8                       | 53.8      | 28.3      | 47.5      |
|   | 25%                       | 49.1                       | 50.7      | 25.9      | 44.5      |
|   | 75%                       | 56.5                       | 57.4      | 31.2      | 51.1      |
| Comparative analysis                            | U                         | 1119                       |           | 43.0      |           |
|   | Z                         | 1.307                      |           | 8.320     |           |
|   | p                         | 0.191                      |           | <0.05     |           |
| Correlation with the level of family well-being | $\rho$                    | 0.270                      |           | 0.317     |           |
|   | t                         | 2.853                      |           | 3.404     |           |
|   | P value                   | <0.05                      |           | <0.05     |           |

## Discussion

Many authors have devoted their research to assessing the relationship between the quality of life and physical activity level of different population groups (Grygus, 2017; Hakman et al., 2018; Kashuba et al., 2021; Krutsevich et al., 2021). In domestic and international science, the field of research is actively growing, which studied the quality of life as a complex medical and social phenomenon (Grygus et al., 2019; Karpukhina et al., 2020; Pavlova et al., 2016). Researchers offer theoretical models aimed at finding relationships between the functional state of an individual and his well-being (Andrieieva & Hakman, 2018; Drozdovska et al., 2020). Studies devoted to the use of health-enhancing recreational technologies to ensure the quality of human life have made it possible to solve some theoretical and practical issues of ensuring an appropriate quality of life for various population groups. Strong evidence (mainly from randomized controlled trials) has shown that, for adults aged 18–65 years, physical activity improves quality of life and well-being (Marquez et al., 2020). Nevertheless, scientific research on the relationship between physical activity and quality of life is narrowly focused, since the main object of study remains somatic health (Andrieieva & Hakman, 2018; Galan et al., 2019; Kashuba et al., 2019). A number of issues regarding the relationship between physical activity and individual components of quality of life, such as mental health, family well-being, life satisfaction, etc., remain insufficiently studied (Andrieieva et al., 2019; Hakman et al., 2020; Orikhovska et al., 2020).

The results obtained in our study expanded scientific knowledge regarding the importance of the optimal level of physical activity for ensuring recreational effect, quality of life, and improving physical and mental health of adult persons. We confirmed the data of researchers (Granero-Jiménez

et al., 2022) regarding the close correlation between the physical activity level and psychological well-being of the study participants. Also, our research results complement the data reported by Sobkey (2014). A study involving 100 participants aged from 18 to 70 revealed a positive association between physical activity and health-related quality of life that was measured with the Short Form Health Survey (SF-36) in 4 domains, including physical functioning, role limitations due to physical health problems, vitality, and general health (Kokandi et al., 2019). Another study of 400 people aged 18–60 using the IPAQ and SF-36 showed that more than half of the studied population (57%) had a low level, 30% had a moderate level, and 13% had a high level of physical activity. In contrast, no individuals with a high level of physical activity were found in our study. Their health-related quality of life was highly correlated with their level of physical activity. The main domains related to physical activity were physical functioning, role limitations due to physical health problems, and general health (Moshibah et al., 2015). Pavlova and co-authors conclude that a low level of physical activity correlates with low indicators of quality of life, in particular with the predominance of passive forms of recreation, reduce quality of life values on the scales of general health, physical functioning, vitality, and mental health (Pavlova et al., 2016). In our study, similar results were obtained, in particular we confirmed the data regarding the relationship between the quality of life of adults and the health status and of physical activity level. Individuals with a moderate level and a low level of physical activity had statistically significant differences in all of the quality of life components.

There is a substantial body of research evidence regarding the relationship between the quality of life and family well-being of parents of children with disabilities (Bjornson et al., 2008; Park, 2021; Pratesi et al., 2021; Silva et al., 2020; Xu et al., 2018). Nevertheless, there is a lack of data on the improvement of quality of life of families due to organizing active leisure time. Researchers note that promoting family physical activity is important for encouraging healthy habits in children. The results obtained in the study (Paez et al., 2022) show that children of parents with a low level of physical activity often have excess body weight, disharmonious physical development, and low physical fitness. Therefore, it is important to encourage parents and children to participate in health-enhancing and recreational physical activities together.

The results of this study provide relevant information to professionals in health-enhancing and recreational physical activity regarding the arguments for increasing the level of participation of clients in regular physical exercise. Further study of the relationship between quality of life and physical exercise, in particular during leisure time, is promising for the development of effective health programs aimed at ensuring a high level of well-being in people of all ages in order to achieve adherence to physical exercise and improve psychological well-being.

The main limitations of this study are related to the sampling technique, since we used an on-line approach, as well as the lack of information on the nature of the parents' employment, which did not allow us to assess the relationship between physical activity level and quality of life depending on professional activity.

## Conclusions

The results of the study confirmed the relationship between quality of life and physical activity level and family well-being. It was found that all the quality of life components in study participants with a moderate level of physical activity were significantly higher ( $p < 0.05$ ) than in the participants with a low level of physical activity. Correlation analysis of family well-being and quality of life indicators revealed significant relationships ( $p < 0.05$ ) between physical functioning, physical role functioning, vitality and mental health.

## Conflicts of interest

The authors declare that they have no competing interests.

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## ЗВ'ЯЗОК МІЖ ЯКІСТЮ ЖИТТЯ ТА РІВНЕМ РУХОВОЇ АКТИВНОСТІ ТА СІМЕЙНИМ БЛАГОПОЛУЧЧЯМ

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

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**Метою дослідження** було оцінити зв'язок між якістю життя та рівнем рухової активності та сімейним благополуччям.

**Матеріали та методи.** Для оцінки рухової активності батьків використовувався Міжнародний опитувальник фізичної активності (IPAQ). Якість життя оцінювали за допомогою Короткої форми (SF-36). Отримані дані обробляли за допомогою кластерного та кореляційного аналізу, описової статистики. У дослідженні взяли участь 106 дорослих людей (сімейних пар), які є батьками дітей дошкільного та молодшого шкільного віку.

**Результати.** Оцінка рухової активності батьків показала, що 62,3% респондентів мають низький рівень і 37,7% мають помірний рівень рухової активності, а осіб з високим рівнем рухової активності не виявлено. Сім'ї з дітьми були розподілені на кластери методом k-means за рівнем рухової активності: кластер 1 включав сім'ї з низьким рівнем рухової активності; а кластер 2 включав родини з помірним рівнем рухової активності. Результати дослідження підтвердили зв'язок між якістю життя, рівнем рухової активності та сімейним благополуччям. Виявлено, що всі компоненти якості життя учасників дослідження з помірним рівнем рухової активності вірогідно вищі ( $p < 0,05$ ), ніж в учасників з низьким рівнем рухової активності. Кореляційний аналіз показників сімейного благополуччя та якості життя виявив достовірний зв'язок ( $p < 0,05$ ) між фізичною активністю, роллю фізичних проблем в обмеженні життєдіяльності, життєздатністю та психічним здоров'ям.

**Висновки.** Доведено наявність прямого статистично значущого кореляційного зв'язку між оцінкою сімейного благополуччя й компонентами якості життя опитаних.

**Ключові слова:** оздоровчо-рекреаційна рухова активність, якість життя, сімейне благополуччя, активне дозвілля, батьки, діти.

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