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**SELF-REPORTED PHYSICAL ACTIVITY OF
ELDERLY RESIDENTS IN WESTERN
SLOVENIAN NURSING HOMES: A
QUESTIONNAIRE-BASED APPROACH**

**SAMOPOROČANA TELESNA AKTIVNOST PRI
STAREJŠIH UPORABNIKIH DOMOV
STAREJŠIH OBČANOV ZAHODNE SLOVENIJE:
ANALIZA S POMOČJO VPRAŠALNIKA**

ABSTRACT

The number of older people (65+ years) in the European Union is expected to reach 130 million by 2050. Regular physical activity has considerable benefits for health and physical functioning in the elderly population. The aim of the study was to evaluate the amount and intensity of self-reported physical activity expressed as energy consumption in a sample of 131 older individuals (aged 83.8 ± 7.6 years, 69% women) living in nursing homes by using the Minnesota Leisure Time Physical Activity Questionnaire. 109 participants reported to perform leisure time physical activity. Only 7.6% of them fulfilled the criteria for low physical activity proposed by Fried et al. (2001). The median energy expenditure (168.5 (IRQ=128.6) kcal/day) also exceeded the cut-off points for low activity. 54% of the participants stated that they perform the so-called heavy physical activity determined in a questionnaire with an intensity code 6 kcal/min or above. The questionnaire-based findings regarding physical activity in nursing homes are in terms of frailty encouraging but they should be verified against a more objective method for physical activity evaluation such as the use of accelerometers.

Keywords: exercise, aged, nursing homes, survey and questionnaires

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IZVLEČEK

Število starejših oseb v Evropski uniji narašča. Projekcije za leto 2050 napovedujejo 130 milijonov oseb starih 65 let in več. Redna telesna aktivnost izkazuje ugodne učinke na zdravje in telesno funkcionalnost starostnikov. Namen raziskave je bil določiti količino in intenzivnost telesne aktivnosti v vzorcu 131 starejših ($83.8 \text{ let} \pm 7.6 \text{ years}$, 69% žensk) uporabnikov domov starejših občanov v zahodni Sloveniji. Telesna aktivnost je bila ovrednotena s pomočjo Minnesota Leisure Time Physical Activity vprašalnika in izražena kot poraba energije v kcal/dan. 109 udeležencev v raziskavi je navedlo, da izvaja pristočasno telesno aktivnost. V vzorcu je samo 7.6% takih, ki na osnovi priporočil avtorjev Fried idr. (2001) dosegajo kriterij nizke telesne aktivnosti. Tudi mediana energetske porabe (168.5 (IQR=128.6) kcal/dan) presega mejne vrednosti za nizko telesno aktivnost. 54% merjencev je navedlo, da izvaja, v vprašalniku t.i. zahtevno telesno aktivnost, katere koda intenzivnosti je enaka ali presega 6 kcal/min. Na osnovi vprašalnika ovrednotena količina in intenzivnost telesne aktivnosti v vzorcu starejših iz domov je z vidika starostne krhkosti spodbudna. Telesno aktivnost bi bilo v nadaljevanju v domovih starejših smiselno ovrednotiti tudi z objektivnejšimi metodami merjenja kot so npr. pospeškometri.

Cljučne besede: telesna aktivnost, starostniki, domovi starejših občanov, vprašalnik

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INTRODUCTION

Europeans are living longer than ever before. The population of older people (aged 65 or more) in the EU-27 will increase significantly, from 90.5 million at the start of 2019 to 129.8 million by 2050. During this period, the number of people aged 75-84 years is projected to rise by 56.1%, while for those aged 65-74 years the increase is expected to be 16.6% (Aging Europe, 2019). The expanded lifespan will result in an increase of degenerative diseases and disabilities (Spiduso, Francis, & MacRea, 2005). These age-related changes can reduce the functional capacity of older people and could induce the decline in physical activity (PA) volume and intensity (Chodzko-Zajko et al., 2009). A very notable concern is the frailty syndrome, representing a state of decreased reserve resulting in increased vulnerability to adverse outcomes when exposed to stressors (Fried, Cohen, Xue, Waltson, Bandeen-Roche, & Varadhan, 2021). In the EU, frailty occurs in 4.1% of all the cases that fall into the 50-64 age group, however, prevalence increases with age, reaching 17.0% in the 75-year-old group (Santos-Eggimann, Cuenoud, Spagnoli, & Junod, 2009). Since physical frailty leads to a poorer quality of life and increases the need for long-term care, early detection of the syndrome plays a crucial role (Zerbo-Šporin, 2017). Regular PA seems to have important benefits for the physical functioning in the healthy elderly population. By the same token, different types of resistance training are beneficial for functional capacity, as they are key to maintaining muscle strength, power, and the neuromuscular capability of the aging people (Zerbo-Šporin, 2019). Therefore, it is understandable that the algorithm which determines the frailty phenotype according to Fried et al. (2001) includes the evaluation of activity level in older people. For better frailty management, a multicomponent intervention is suggested to impact different aspects of physical functioning (Angulo, El Assar, Alvarez-Bustos, & Rodriguez-Mañas, 2020). It seems that a structured, moderate-intensity physical activity programme is not associated with a reduced risk for frailty among sedentary, community-dwelling older adults (Trombetti, et al., 2018). Exercise programmes should start at a low to moderate intensity level and progressively lead to moderate - high levels of training. Of course, an exercise programme should also pay close attention to an older individual's medical conditions and disabilities, which means it should be personalised in order to be most effective and safe (Aguirre, & Villareal, 2015).

The aim of the study was to evaluate the amount and intensity of self-reported PA in a sample of older individuals living in nursing homes on the basis of using the questionnaire which is a

part of the frailty phenotyping procedure. The focus was also on monitoring the so-called *heavy PA*, which is, as the literature suggests, important for minimising the risk of frailty.

METHODS

Participants

In the period from June to October 2019, older adults from six (6) western Slovenian nursing homes were invited to participate in the study on the prevalence of frailty. For the candidates to be involved in the study, they had to meet the following criteria: (1) aged 65 or above, (2) able to stand and walk (walking aids permitted), (3) Mini-Mental State Examination (MMSE) score above 18. A written consent was obtained from 131 candidates (aged 83.8 ± 7.6 years, 69% of whom were women). The study was conducted in accordance with the Declaration of Helsinki and was a part of larger research, approved by the National Medical Ethics Committee of the Republic of Slovenia.

Study protocol

To define the frailty phenotype according to Fried et.al. (2001), the following criteria were taken into consideration: (1) weight loss in the past year, (2) self-reported exhaustion, (3) grip strength, (4) walk time and (5) physical activity level, defined by using the short version of the Minnesota Leisure Time Physical Activity Questionnaire (MLPTA-Q) (Taylor, Jacobs, Schucker, Knudsen, Leon, & Debacker, 1978). MLPTA-Q is a tool that classifies individual's physical activities performed in leisure time, based on his/her calorie expenditure. Energy expenditure (Activity Metabolic Index – AMI) for a specific activity was calculated (1) as a product of intensity code (I) (kcal/min), based on literature values for associated oxygen consumption and the duration (min) of PA in one year (D). AMI is expressed in kcal/day; therefore, the aforementioned product is divided by 365.

$$AMI = \frac{I * D}{365} \left(\frac{kcal}{day} \right) \quad (1)$$

To calculate (2) the duration of PA in one year using the MLPTA-Q, the respondent was asked to report the number of months (M) in which the activity was performed, the average number of sessions in each month (F - frequency) and the average time (in minutes) of activity for each session (T).

$$D = M * F * T \quad (min) \quad (2)$$

The overall AMI (total AMI) indicates the sum of all the individual's activities (3).

$$total\ AMI = \frac{sum(I*D)}{365} \left(\frac{kcal}{day} \right) \quad (3)$$

According to their intensity code, physical activities were classified into one of the following categories: light PA (intensity ≤ 4 kcal/min), moderate PA (intensity > 4 kcal/min and ≤ 5.5 kcal/min), heavy PA (intensity ≥ 6 kcal/min). Therefore, the total AMI could also be reported as the sum of light, moderate and heavy AMI of an individual (4):

$$total\ AMI = lightAMI + moderateAMI + heavy\ AMI \left(\frac{kcal}{day} \right) \quad (4)$$

In the study, we determined how many participants reported that they performed heavy PA. The total energy expenditure was compared to the cut off points for low activity (< 270 kcal/week in men and < 383 kcal/week in women) proposed by Fried et al. (2001).

In MLTPA-Q, the activities are collected into eight (8) general categories: walking and miscellaneous, conditioning exercise, water activities, winter activities, sports, lawn and garden activities, home repair activities, and fishing and hunting. Within these categories, we find physical activities of different intensities. In the study, we identified the most frequently listed heavy PA in MLTPA-Q.

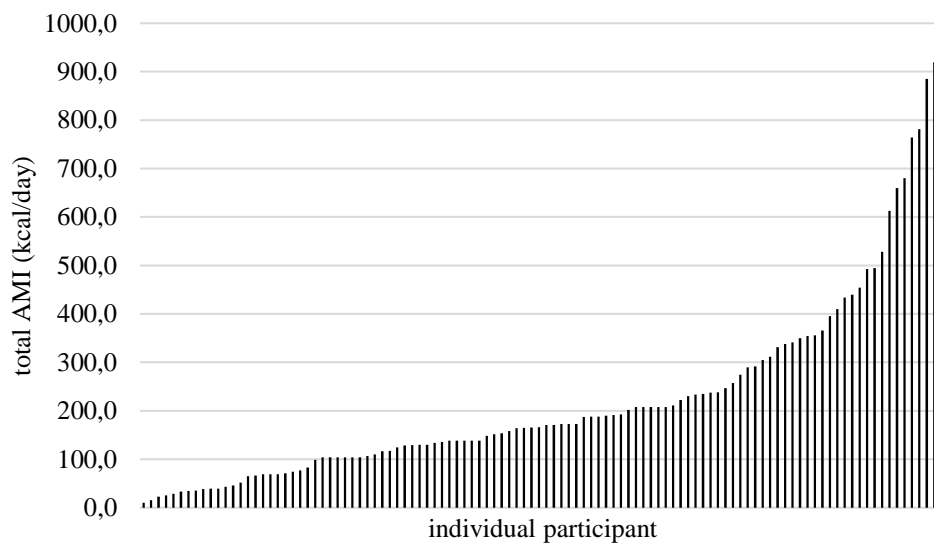
Data analysis

The Microsoft Office Excel (MS for Windows 365 MSO, 2017) was used for data collection and analysis. The data were descriptively presented by minimum (Min), maximum (Max) and median (MED) values with the interquartile range (IQR).

RESULTS

Overall, 131 participants, residents in six nursing homes in western Slovenia (aged 83.8 ± 7.6 years, 69% of whom were women), were included in the study. 22 participants reported no leisure time PA; therefore, the remaining 109 questionnaires were analysed. The distribution of the total energy expenditure data expressed in AMI appears to be asymmetric (Figure 1), showing that one tail is longer than the other and negatively skewed.

Figure 1. Distribution of total energy expenditure in leisure time physical activities for nursing home residents.



Legend: AMI = Activity Metabolic Index

The median energy expenditure expressed in AMI was 168.5 (IQR= 127.6) kcal/day (Table 1). A close median AMI was found in men and in women (170.6 (IQR=163.2) and 166.5 (IQR=207.7) kcal/day, respectively).

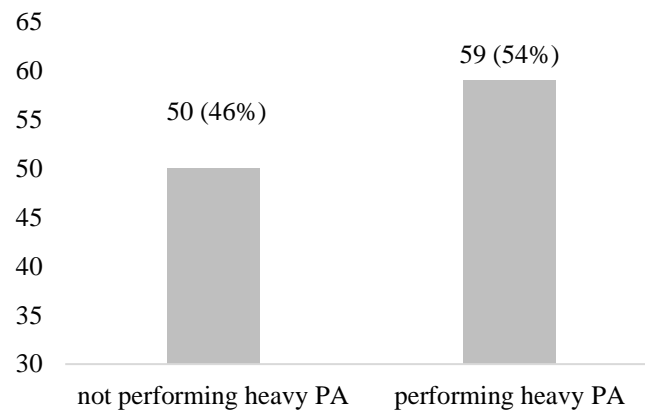
Table 1. Total energy expenditure in leisure time physical activities for nursing home residents, separated by gender.

	Men (n=30)	Women (n=79)	Total (n=109)
Min total AMI (kcal/day)	23.1	10.4	10.4
Max total AMI (kcal/day)	979.1	919.8	979.1
MED (IQR) total AMI (kcal/day)	170.6 (163.2)	166.5 (207.7)	168.5 (127.6)

Note: AMI = Activity Metabolic Index, Min = minimal value, Max = maximal value, MED = median, IQR = interquartile rang.

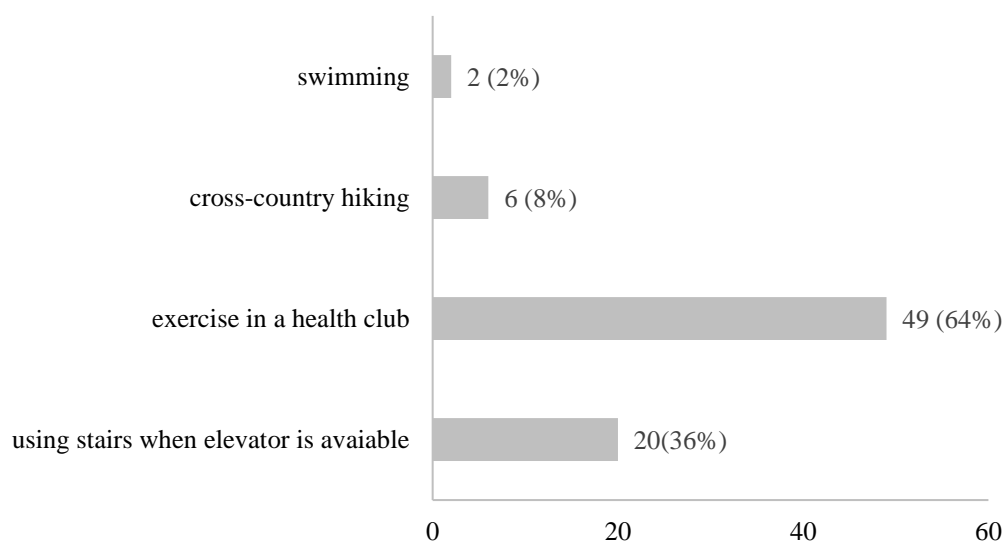
59 (54%) participants reported PA that is according to MLTPA classified as heavy PA (intensity code ≥ 6 kcal/min; Figure 2).

Figure 2: Number and percentage of participants that perform/do not perform heavy PA.



Among the possible options of PA in MLTPA-Q, *exercising in a health club* was the most commonly cited heavy PA (64%), followed by *using stairs when elevator is available* (20%), *cross-country hiking* (8%) and *swimming* (2%) (Figure 3).

Figure 3: Frequency and percentage of heavy physical activities that were performed the most.



DISCUSSION

In the study, the amount and intensity of self-reported PA using MLTPA-Q (Taylor et al., 1978) was determined in 109 older individuals (+65 years) who live in the nursing homes of western Slovenia and expressed in AMI as an energy consumption value. Low physical activity is one of the five criteria in the validated clinical phenotype of frailty (Eckel, Bandeen-Roche, Chaves, Fried, & Louis, 2011).

In our sample of nursing home residents, the median total AMI was 168.5 (IQR=127.6) kcal/day. Very similar values were found in men and women (170.6 (IQR=163.2) and 166.5 (IQR=207.7) kcal/day, respectively). The median energy expenditure exceeded the cut off points for low activity (< 270 kcal/week in men and < 383 kcal/week in women) proposed by Fried et al. (2001). Only 7.6% of participants in the study fulfilled these criteria. A smaller percentage (only 2.0%) of low energy consumption was reported by Drey, Pfeifer, Sieber, & Bauer (2011). It appears that the older adults included in their survey were recruited by advertising. Therefore, their participants were not purely institutionalised in nursing homes as in our case.

The older people from our sample on average do not show a clinically important reduction of energy consumption due to low physical activity. The obtained median total AMI was lower in comparison to the study of Ziller, Braun, & Thiel (2020) where the average total AMI of 2353 (1547) kcal/week was found. It should be noted that the latter study addressed the community-dwelling older adults in whom we expect less mobility limitations than in those housed in nursing homes.

54% of participants in our study reported physical activities that are according to MLTPA-Q classified as *heavy PA* (intensity code ≥ 6 kcal/min). The most often listed *heavy PA* was exercising in a health club, as expected. In nursing homes, a guided exercise session is scheduled daily and the residents have the opportunity to join the health club, which increases the frequency of performing this activity. For example, in a study by De Souto Barreto, Demougeot, Vellas, & Rolland (2014), 1914 participants from 5402 (35.4 %) participated in exercise classes provided in nursing homes. The second most commonly listed activity in our sample was using stairs instead of elevators. In nursing homes both stairs and elevators are available and some residents usually choose to use the stairs.

As step counts may correlate positively with questionnaire-based PA (De Cocker, De Bourdeaudhuij, & Cardon, 2008), but may also greatly differ from the data obtained through the use of questionnaires (Prince, Adamo, Hamel, Hardt, Connor Gorber, & Treblay, 2008), an accelerometer-based assessment of PA in older adults should be used for further analysis.

Study limitations

This study has potential limitations. The obtained results might not reflect the physical activity practice among all Slovenian older adults living in nursing homes. Moreover, we only included participants if they met certain inclusion criteria. For further research, we suggest adding an

objective tool (e.g. accelerometers) to assess physical activity in nursing homes. We also suggest verifying whether the exercising reported by the responders always reflects the MLTPA-Q category *home-based* or *health-club based exercise* requirements.

CONCLUSION

In conclusion, in the sample of older adults living in nursing homes, only 7.6% of participants met the criteria for low physical activity proposed by Fried et al. (2001). Even the median energy expenditure exceeded the cut-off points for low activity. The questionnaire-based findings are encouraging but should be verified with a more objective method for PA evaluation.

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Conflict of interest

The authors declare no potential conflicts of interest.

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