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ORIGINAL ARTICLE

Subjective assessment of sedentary behavior between theory and practice: Pilot study using the "Sedentary meter"

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Abstract

Although sedentary behavior (SB) is still an under-researched area, some studies have shown a significant association between prolonged sitting and an increased risk of mortality, due to various causes, independent of physical activity. Despite the health risks, there are currently no specific guidelines for individuals to self-assess their SB. A pilot observational study was conducted as part of the "Knowledge for Health" event. A short online quiz "Sedentary meter" was developed, consisting of a pictorial scale to help event participants assess their daily sedentary time and to promote a better understanding of the associated health risks. The quiz questions were formulated based on the WHO definition of SB. The participants' task was to subjectively estimate the amount of sedentary time in various types of SB on a typical day. The results obtained for SB could then be immediately compared with the figurative scale based on the WHO guidelines. The analysis confirmed SB (533.0±224.7 min/day) in all age groups, although possible differences according to the type of SB were noted. Despite statistically non-significant differences, those between age groups may indicate the extent to which SB can be individualized. The differences between age groups may indicate the importance of considering SB which can be targeted based on each age group's daily routine. The simple tool for accessing SB raised awareness of which specific type of SB accounts for the majority of participants' daily sedentary time. The self-critical acceptance of the "poor results" across all age groups shows the effectiveness of the initiative in raising awareness of SB issues.

Keywords: sedentary behavior · self-assessment · types of sedentary behavior · pilot study

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Introduction

Sedentary behavior (SB) is a relatively new phenomenon in contemporary society, primarily related to industrialization (Jochem et al., 2017). Currently, researchers often associate SB with a sedentary lifestyle (SL), due to limited opportunities for physical activity sedentary occupations, and increased screen time. Current research has shown that SB has long-term negative effects on the human body, such as an increased risk of cardiovascular disease, metabolic diseases, cancer development, musculoskeletal disorders, depression, and cognitive disorders (Park et al., 2020; World Health Organization, 2020).

The Sedentary Behavior Research Network (SBRN) defined SB as any waking behavior characterized by an energy expenditure of ≤ 1.5 metabolic equivalents (METs) while in a sitting or reclining posture (Tremblay et al., 2017), which includes both postural (sitting or reclining), and energy expenditure (< 1.5 METS) (Marconcin et al., 2021a). In defining SB, we must also recognize the difference between SB and physical inactivity (PI), where PI individuals are those who are not sufficiently physically active (PA) to achieve current PA recommendations (World Health Organization, 2020). Although some studies have recognized a possible link between SB and reduced PA (Elgar et al., 2005; Mansoubi et al., 2014; Pearson et al., 2014), the focus of this pilot study remains on the subjective assessment and detection of sedentary time.

The field of SB is still inadequately researched. There is a lack of accurate data on the daily duration of sedentary behavior that poses a health or mortality risk (Marconcin et al., 2021a). Some studies have shown a significant association between prolonged sitting and an increased risk of mortality due to various causes, independent of physical activity (Van der Ploeg, 2012). As a result, there is a growing body of research advocating a reduction in sitting time or regular active breaks from sitting (López Torres et al., 2021), which has led to the development of guidelines aimed at curbing SB at both national (Ross et al., 2020) and global (World Health Organization, 2020) levels.

Therefore, one challenge is to combine scientific knowledge with behavioral guidelines. It has been observed that people's awareness of SB is limited (Marconcin et al., 2021b). Discrepancies in subjective reporting were found in studies depending on whether participants reported total daily sedentary time or whether they divided it based on daily activities associated with specific types of SB, such as eating, screen time, and work. Notably, participants reported longer daily sedentary time when they broke it down by activity than when they reported total time (Prince et al., 2018). This suggests a gap in knowledge and awareness of what activities are considered sedentary in the average person's daily life.

The pilot study has two aims; (i) to review the existing pilot questionnaire to estimate the extent of SB and (ii) to evaluate the subjective perception of participants regarding their SB. Based on the positive results of the evaluation, the next goal will be the development and validation of a questionnaire to assess SB.

Method

This pilot study included 115 participants of all ages. The pilot study enrolled participants who attended the event "Knowledge for Health" on 17. November 2023 (ZRS Koper, 2023). A Web survey was conducted to collect data on participants' subjective information on SB and to self-assess daily sedentary time. The designed questionnaire reflected the World Health Organization (WHO) definition of SB, which emphasizes various daily settings such as work, school, home, and transport (World Health Organization, 2020). Each question was intended to cover one type of SB and capture not only time spent sitting but also time spent resting, e.g. lying on a couch. Participants indicated their estimated types of SB in minutes per day and were asked to relate these estimates to a typical weekday. Although precise data are not yet available, the questionnaire for assessing the acceptable threshold for daily sedentary time threshold at 4 hours is based on the scientific evidence currently available (Chau et al., 2013; Ekelund et al., 2018; López Torres et al., 2021; Marques & Rúbio Gouveia, 2021; Van der Ploeg, 2012).

The questionnaire consisted of 7 units, including an estimate of time spent sedentary during/at: eating (including breakfast, lunch, dinner, and other meals); transportation (by car, bus, train, etc.); screen time during leisure time (computer, tablet, phone, TV); at school, lectures or work/daily occupation; leisure activities like (reading, solving crossword puzzles, and similar activities); engaging in "sedentary hobbies" (chess, playing cards, crocheting, other handicrafts, etc.); spending time with friends (drinks, coffee time, conversation, etc.)

A quiz-style questionnaire was used for this pilot study. While the respondents answered the questionnaire, an automatic counter counted up the individual answers. Respondents could immediately place their total estimated time spent on specific types of SB on a comparison scale displayed at the end of the completed questionnaire.

The web survey was designed using 1KA tool (1KA, 2023), while the "Sedentary meter" was created using the Canva platform (Canva, 2023). Since the respondents were random visitors of the "Knowledge for Health" event, a purposive approach was employed instead of a random sampling method to select the sample. Prior to completing the online survey, all participants confirmed that their data would be used in accordance with the provisions of the General Data Protection Regulation.

All statistical analyses were performed using Microsoft Excel 2016 (Microsoft Corporation, Redmond, WA, USA) and SPSS Statistics Version 27 (IBM, Chicago IL, USA). Since this was a pilot study, we focused on how SB varies by gender and age group, which is why we did not include additional socioeconomic status (SES) characteristics. However, due to the uneven distribution of data by gender resulting from the sampling method, our analysis concentrated solely on age group differences in SB. The data were collected for six age groups: ≥ 15 years, 16–18 years, 19–30 years, 31–45 years, 46–64 years, and 65–80 years. Due to the purposive approach, we had only one participant in the first age group, so we excluded them from further analysis. Results were analyzed by age groups: 16 – 18 years, 19 – 30 years, 31 – 45 years, 46 – 64 years and 65 – 80 years. Moreover, the results are presented by mean values and standard deviation (SD), when divided into age groups, results are presented with percentages. The comparison between the age groups and the different seating categories for normally distributed values was performed using a one-way analysis of variance (ANOVA), with Bonferroni correction for multiple comparisons. The statistical significance was set at $p \leq 0.05$.

Results

A total of 114 participants completed the questionnaire, sample characteristics are represented in Table 1. Despite the absence of precise data, a daily sedentary time threshold of 4 hours has been established based on existing scientific evidence (Chau et al., 2013; Ekelund et al., 2018; López Torres et al., 2021; Marques & Rúbio Gouveia, 2021; Van der Ploeg, 2012).

Table 1. Sample characteristics

Age group (years)	Total (N = 114)	Female (N = 80, 70.2 %)	Male (N = 34, 29.8%)
16-18	20 (17.5 %)	10	10
19-30	32 (28.1 %)	23	9
31-45	27 (23.7 %)	19	8
46-64	20 (17.5 %)	16	4
65-80	15 (13.2 %)	12	3

The participants were divided into five groups based on their age, 16-18 years, 19-30 years, 31-45 years, 46-64 years, and 65-80 years. After analyzing the results of self-reported daily sedentary time, the oldest age group reported spending the least time sedentary (394.3 ± 106.8 min), followed by 19-30-year-olds (512.0 ± 212.0 min), then the 31-45-year-olds (556.1 ± 259.7 min), then the 46-64-year-olds (589.4 ± 287.9 min) and finally 16-18-year-olds (590.5 ± 142.3 min) (Figure 1). Overall, the participants reported an average daily sedentary time of 533.0 ± 224.7 min, ranging from 20 min to 1160 min.

Participants subjectively estimated the amount of time they spent on a specific type of SB. The program then totaled the time for each type of SB, providing participants with an overall assessment of their sedentary time (Table 2). The results of the frequency analysis show that for the majority of participants within the age groups (16-18 years=65.0%, 19-30 years=40.6%, 31-45 years=40.7%, 65-80 years=53.3%) the assessment of overall sedentary time indicated that they were sedentary for 6 to 10 hours per day (361-600 minutes/day) on a typical day. With the exception of 46-64-year-olds, where the assessment of overall sedentary time showed that the highest number of participants (30.0%) were sedentary for more than 12 hours per day (>720 min/day)

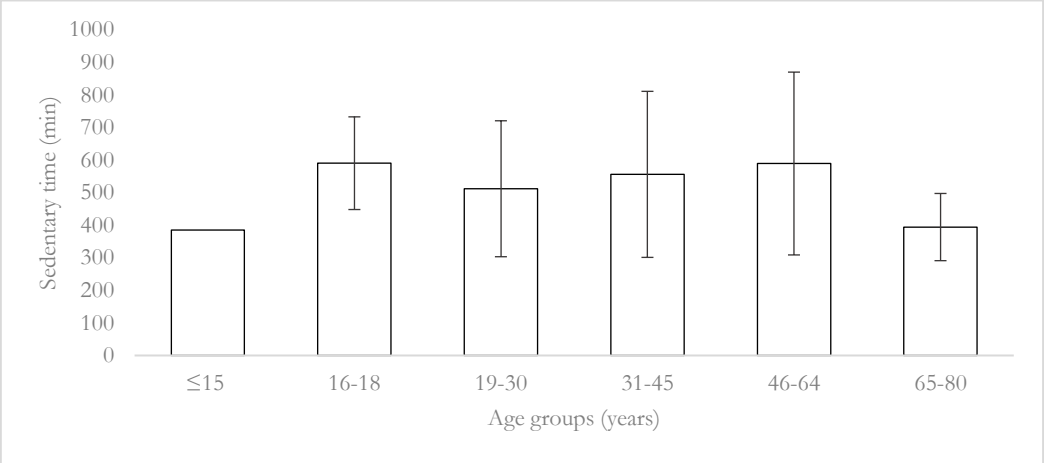

Figure 1. Total sedentary time by age group

Table 2. Total estimated time spent in different types of SB

	Age group (years)				
	16-18 (N=20)	19-30 (N=32)	31-45 (N=27)	46-64 (N=20)	65-80 (N=15)
< 240 min		12.5	7.4	15.0	6.7
240-360 min		12.5	14.8	5.0	33.3
361-600 min	65.0	40.6	40.7	25.0	53.3
601-720 min	15.0	21.9	11.1	25.0	6.7
>720 min	20.0	12.5	25.9	30.0	
TOTAL	100.0	100.0	100.0	100.0	100.0

Note: f: presented in frequencies (%)

In the first, second, third, and fourth age groups, the order in which they reported sedentary time was similar. They all stated that they spent the least time sedentary with hobbies (10.5 ± 27.8 min; 9.7 ± 22.2 min; 5.7 ± 10.6 min; 11.9 ± 16.5 min) and the most time at school and/or work (324.0 ± 60.8 min; 235.9 ± 159.4 min; 258.2 ± 165.9 min; 278.8 ± 204.0 min). The oldest age group stated that they spent the least time sedentary at work (9.3 ± 21.2 min) and the most time in front of a screen (186.0 ± 79.5 min). Results are represented in Table 3.

There were no differences between age groups in terms of time spent in different types of SB, whether eating ($p = .133$), transportation ($p = .216$), screen time during leisure time ($p=.169$), or socializing with friends ($p = .851$). Differences in sedentary time between age groups were found in types of SB, such as time spent in school (during lectures) or at work ($F(4, 109) = 11.208$; $p < 0.001$), and in engaging in sedentary leisure activities ($F(4, 109) = 10.528$; $p < 0.001$).

In general, transportation as a type of SB takes the most time for individuals aged 31-45- (47.6 ± 47.8 min) and the least time for the oldest group (20.0 ± 18.5 min), which is expected due to daily transportation to work. Among age groups, the oldest age group also spends the most time sedentary while eating (82 ± 18.5 min), reading or doing crossword puzzles (56.3 ± 27 min) and engaging in sedentary hobbies such as chess, playing cards, crocheting, and other handicrafts (12 ± 21.4 min), indicating the highest proportion of sedentary leisure activities.

The type of SB during leisure time with the smallest differences between the groups was the so-called coffee time/talking with friends. From the first to the sixth age group, the duration was as follows: 30 min; 24.8 ± 25.1 min; 32 ± 30.9 min; 25.4 ± 26.1 min; 27.9 ± 16.8 min; 28.6 ± 21.8 min.

Table 3: Self-reported daily sedentary time by age group and by type of SB

	Age group (years)				
Type of SB (min)	16-18	19-30	31-45	46-64	65-80
Eating	72.8 ± 39.5	72.0 ± 29.5	55.0 ± 47.8	71.6 ± 52.4	82.0 ± 18.5
Transportation	39.0 ± 16.0	36.6 ± 29.5	47.6 ± 47.8	45.2 ±52.4	20.0 ± 18.5
Screen time	102.5 ± 92.4	112.2 ± 68.2	143.9 ± 146.9	124.2 ± 123.8	186.0 ± 76.8
School and/or work time	324.0 ± 59.3	235.9 ± 156.9	258.2 ± 162.8	278.8 ± 198.8	9.3 ± 20.5
Other leisure activities	17.0 ± 20.9	13.6 ± 19.0	20.4 ± 17.8	30.0 ± 27.4	56.3 ± 27.0
Sedentary hobbies	10.5 ± 27.1	9.7 ± 21.9	5.7 ± 10.4	11.9 ± 16.1	12.0 ± 21.4
Time with friends	24.8 ± 25.2	32.0 ± 30.9	25.4 ± 26.1	27.9 ± 16.8	28.7 ± 21.8
TOTAL	590.5 ± 142.3	512.0 ± 208.7	556.1 ± 254.9	589.5 ± 280.7	394.3 ± 103.1

Discussion

As part of the "Knowledge for Health" event, an initiative to raise awareness of SB was launched. A quiz questionnaire and a comparison scale that participants can use to self-assess their daily sedentary time were developed, focusing on the types of SB in their typical day.

The main purpose of this pilot study was to test the existing pilot questionnaire to estimate the extent of SB and to assess participants' subjective perceptions of their SB. Participants were indirectly encouraged to think about what activities in their typical day make up sedentary time. In this way, participants were able to better understand the definition of SB. Self-critically accepting "poor" results across all age groups indicates the effectiveness of the initiative to raise awareness about SB issues. Participants were surprised at how much time they spent on a typical day in different types of SB that they had not even considered sedentary before.

A comparative scale ("Sedentary meter") was created, showing the estimated sedentary time in minutes per day in relation to increased health risk (Figure 2). The threshold for acceptable daily sedentary time was set at 4 hours based on existing scientific evidence (Chau et al., 2013; Ekelund et al., 2018; López Torres et al., 2021; Van der Ploeg, 2012), although precise data are still lacking (Marques & Rúbio Gouveia, 2021). "Sedentary meter" allowed participants to compare their results with WHO guidelines, bridging the gap between theory and practice.

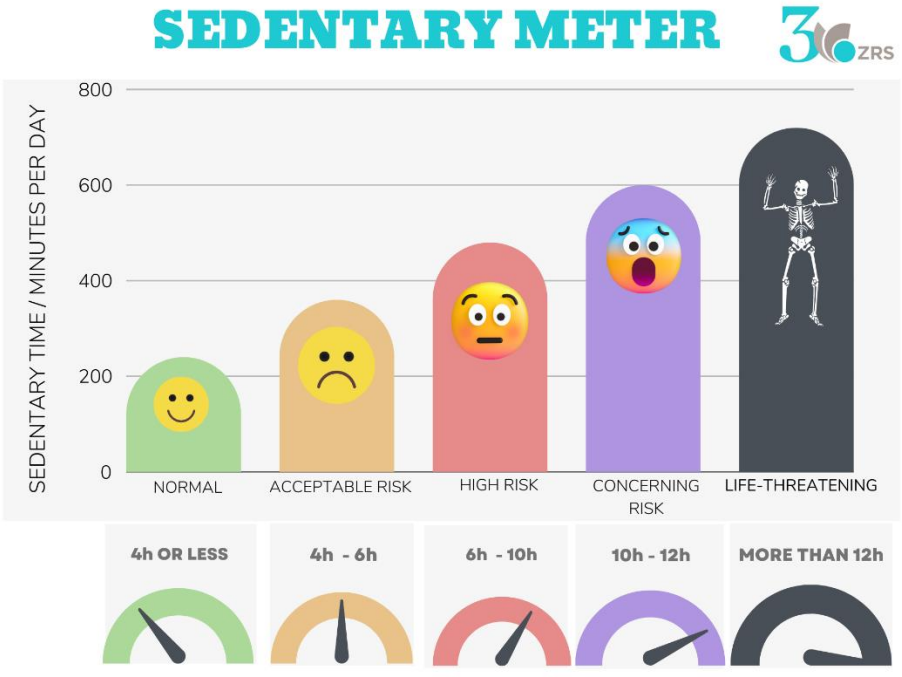

Figure 2. "Sedentary Meter"

The inconsistency of previous research findings on the adverse health risks and mortality associated with daily sedentary time underscores the need for clearer recommendations (Marconcin et al., 2021b; Park et al., 2020; World Health Organization, 2020). This points to a limitation in the "Sedentary meter" design, which lacks precision. Therefore, further quantitative and qualitative studies on SB are necessary to provide precise guidelines. On the other hand, the use of color and simplicity for the creation of a comparative scale was intended to make it easier to understand for the general public including all age groups. Symbols were used on the "Sedentary meter" to grab participants' attention, especially by emphasizing the life-threatening risks of SB more vividly.

The pilot study aimed to develop a questionnaire to assess time spent sedentary in various types of SB per day, following the WHO definition (World Health Organization, 2020), which was well established but had some shortcomings in its implementation, so it primarily serves as a good starting point for further development.

During the implementation phase, in collaboration with respondents, conclusions were reached regarding the need for further subdivision or elaboration of certain types of SB. For instance, efforts were made to enhance accuracy by dividing questionnaire questions to distinguish between sedentary time during work or daily occupation and sedentary time during lectures or school activities. This decision was prompted by the suggestion that individuals in older age groups may be engaged in both work and school activities, necessitating separate estimates of sedentary time for each context.

This result is indirectly consistent with the study by Prince et al. (2018), which found that people subjectively report their sedentary time per day more accurately when the questionnaire is divided into many domains reflecting different types of SB. The more subdivided the questionnaire was, the more accurate the subjectively estimated sedentary time was compared to objective methods for measuring sedentary time. Comparing subjective methods to assess sedentary behavior is planned for future research. We conducted this pilot study to evaluate only the "Sedentary meter" questionnaire, especially its awareness-raising initiative dimension.

Despite the limitations in the research method, SB was identified across all age groups, and potential differences between age groups were noted. Due to the specific purpose of the questionnaire (an awareness-raising initiative), the sample was selectively recruited, resulting in an insufficient representation of the youngest age group (≤15 years). Consequently, accurate comparisons of SB between different age groups present challenges.

In examining SB, several recent studies have also focused on the gender dimension, with some of these studies finding differences in the extent of SB between men and women (Kallio et al., 2020, Prince et al., 2020, Tanaka et al., 2019), but not all (Edelmann et al., 2022). Interestingly, differences were found between gender groups in SB depending on the daily occupation of the age group (working population, pupils, students) and the type of SB (video games, reading) (Kallio et al., 2020, Prince et al., 2020, Tanaka et al., 2019). This suggests the need for further research in this area. However, this pilot study focuses only on the differences between age groups, as the distribution of data by gender is uneven due to the sampling procedure (F=70.2%, M=29.8%).

Recognizing potential disparities among age groups regarding type of SB is vital, considering the importance of raising awareness of these behaviors, which often constitute the predominant portion of daily sedentary time for individuals. The limitations of our research underscore the need for further investigation to gain a more comprehensive understanding of these differences. The wide dispersion of data within age groups may also indicate the extent to which different types of SB can be individualized.

The initiative underlines the need to develop more accurate questionnaires to assess SB, covering as many different activities as possible. To date, studies have shown that a range of demographic, sociocultural and interpersonal factors are associated with SB (Chastin et al., 2015; Owen et al., 2011; Van Sluijs et al., 2008). However, this pilot study focused primarily on types of SB as the most specific aspect of SB assessment. This aimed to raise awareness about SB and reduce it, by targeting key types of SB that contribute the most to an individual's daily sedentary time. Future research will explore the potential connection between SB and broader socio-cultural factors.

Considering that some types of SB are practically necessary (such as school or work) and it is difficult to interrupt sedentary behavior (M. Hegarty et al., 2016; Owen et al., 2011), the recommendations should be adapted according to the age group as part of the sensitization process. This would be in line with existing WHO practice (World Health Organization, 2020) and would ensure adaptation at

an institutional level. Based on the success of this pilot study and its impact on raising awareness, the recommendations for reducing SB should be further adapted as personalized interventions. This would help improve current, imprecise guidelines.

Despite the inadequate sampling, possible differences between the age groups and sedentary time duration were identified. The age groups that spent the most time sedentary while at school or work were the top five, which is to be expected for the school-age and working-age populations (Bauman et al., 2017). As anticipated, the oldest age group spends the least time sedentary at school or work. However, they reported spending most of their leisure time sedentary in front of a screen, which is consistent with the findings of a 2017 comparative study, The Descriptive Epidemiology of Sedentary Behavior, which showed that SB has increased in the old age group (≥60) precisely because of increased time spent in front of screens (Bauman et al., 2017), and is no longer a characteristic primarily of the younger or adult population.

Given the limitations of the pilot study, further studies and the development of a questionnaire to help people assess their daily sedentary time more accurately, are needed. Validation of this questionnaire is planned to ensure its accuracy and reliability. In the pilot study, despite the mentioned shortcomings of the pilot version of the questionnaire, researchers provide participants with guidance at the event upon completing the questionnaire and receiving the results, highlighting the added value.

In line with previous research (Dempsey et al., 2018; Imtiyaz Ali Mir, 2021) and WHO (World Health Organization, 2020) guidelines, participants were advised to reduce prolonged sitting and other types of SB by taking regular active breaks of at least 30 minutes intervals. By receiving concrete, practical advice, participants were encouraged to take proactive steps to reduce SB. Most importantly, the questionnaire encouraged participants' awareness of the activities in which they spend the most time sedentary each day.

Studies investigating how to reduce sedentary time have shown that SB is primarily a behavior related to daily habits and routines (Imtiyaz Ali Mir, 2021; López Torres et al., 2021), so self-observation, environmental restructuring and education have proven to be the most promising interventions (Gardner et al., 2015). This pilot study helps to raise awareness of SB, which is seen as a key step toward implementing interventions such as self-monitoring.

Further refinement and broader use of the questionnaire could extend this awareness to a wider audience, contributing to the dissemination of knowledge about SB. The initiative will serve as a groundwork for future research in this field.

References

1KA (Version 23.06.20) [software]. (2023). Koper: Znanstveno-Raziskovalno Središče Koper. Available at https://www.1ka.si

Canva. (2023). Design tool. Available at https://www.canva.com/sl_si/

Chastin, S. F. M., Buck, C., Freiberger, E., Murphy, M., Brug, J., Cardon, G., O'Donoghue, G., Pigeot, I., & Oppert, J.-M. (2015). Systematic literature review of determinants of sedentary behavior in older adults: a DEDIPAC study. International Journal of Behavioral Nutrition and Physical Activity, 12(1). https://doi.org/10.1186/s12966-015-0292-3

Chau, J. Y., Grunseit, A., Midthjell, K., Holmen, J., Holmen, T. L., Bauman, A. E., & Van der Ploeg, H. P. (2013). Sedentary behaviour and risk of mortality from all-causes and cardiometabolic diseases in adults: evidence from the HUNT3 population cohort. *British Journal of Sports Medicine*, *49*(11), 737–742. https://doi.org/10.1136/bjsports-2012-091974

Dempsey, P. C., Larsen, R. N., Dunstan, D. W., Owen, N., & Kingwell, B. A. (2018). Sitting Less and Moving More. Hypertension, 72(5), 1037–1046. https://doi.org/10.1161/hypertensionaha.118.11190

Edelmann, D., Pfirrmann, D., Heller, S., Dietz, P., Reichel, J. L., Werner, A. M., Schäfer, M., Tibubos, A. N., Deci, N., Letzel, S., Simon, P., & Kalo, K. (2022). Physical Activity and Sedentary Behavior in University Students–The Role of Gender, Age, Field of Study, Targeted Degree, and Study Semester. Frontiers in Public Health, 10. https://doi.org/10.3389/fpubh.2022.821703

Ekelund, U., Brown, W. J., Steene-Johannessen, J., Fagerland, M. W., Owen, N., Powell, K. E., Bauman, A. E., & Lee, I-Min. (2018). Do the associations of sedentary behaviour with cardiovascular disease mortality and cancer mortality differ by physical activity level? A systematic review and harmonised meta-analysis of data from 850 060 participants. *British Journal of Sports Medicine*, *53*(14), 886–894. https://doi.org/10.1136/bjsports-2017-098963

Elgar, F. J., Roberts, C., Moore, L., & Tudor-Smith, C. (2005). Sedentary behaviour, physical activity and weight problems in adolescents in Wales. Public Health, 119(6), 518–524. https://doi.org/10.1016/j.puhe.2004.10.011

Gardner, B., Smith, L., Lorencatto, F., Hamer, M., & Biddle, S. J. (2015). How to reduce sitting time? A review of behaviour change strategies used in sedentary behaviour reduction interventions among

adults. Health Psychology Review, 10(1), 89–112. https://doi.org/10.1080/17437199.2015.1082146

Imtiyaz Ali Mir. (2021). Sedentary Behavior, Cardiovascular Risk and Importance of Physical Activity and Breaking-Up Sedentary Behavior. https://doi.org/10.5772/intechopen.96118

Jochem, C., Schmid, D., & Leitzmann, M. F. (2017). Introduction to Sedentary Behaviour Epidemiology. *Sedentary Behaviour Epidemiology*, 3–29. https://doi.org/10.1007/978-3-319-61552-3_1

Kallio, J., Hakonen, H., Syväoja, H., Kulmala, J., Kankaanpää, A., Ekelund, U., & Tammelin, T. (2020). Changes in physical activity and sedentary time during adolescence: Gender differences during weekdays and weekend days. Scandinavian Journal of Medicine & Science in Sports, 30(7), 1265–1275. https://doi.org/10.1111/sms.13668.

López Torres, O., Lobo, P., Baigún, V., & F. De Roia, G. (2021). How to Reduce Sedentary Behavior at All Life Domains. *Sedentary Behaviour - a Contemporary View*. https://doi.org/10.5772/intechopen.97040

M. Hegarty, L., L. Mair, J., Kirby, K., Murtagh, E., & H. Murphy, M. (2016). School-based Interventions to Reduce Sedentary Behaviour in Children: A Systematic Review. AIMS Public Health, 3(3), 520–541. https://doi.org/10.3934/publichealth.2016.3.520

Mansoubi, M., Pearson, N., Biddle, S. J. H., & Clemes, S. (2014). The relationship between sedentary behaviour and physical activity in adults: A systematic review. Preventive Medicine, 69, 28–35. https://doi.org/10.1016/j.ypmed.2014.08.028

Marconcin, P., B. Júdice, P., Ferrari, G., Werneck, A., & Marques, A. (2021b). Methods of Assessing Sedentary Behaviour. *Sedentary Behaviour - a Contemporary View*. https://doi.org/10.5772/intechopen.99567

Marconcin, P., Zymbal, V., R. Gouveia, É., Jones, B., & Marques, A. (2021a). Sedentary Behaviour: Definition, Determinants, Impacts on Health, and Current Recommendations. *Sedentary Behaviour - a Contemporary View*. https://doi.org/10.5772/intechopen.100250

Marques, A., & Élvio Rúbio Gouveia. (2021). Sedentary Behaviour - A Contemporary View. In IntechOpen eBooks. IntechOpen. https://doi.org/10.5772/intechopen.91074

Owen, N., Sugiyama, T., Eakin, E. E., Gardiner, P. A., Tremblay, M. S., & Sallis, J. F. (2011). Adults' Sedentary Behavior. American Journal of Preventive Medicine, 41(2), 189–196. https://doi.org/10.1016/j.amepre.2011.05.013

Park, J. H., Moon, J. H., Kim, H. J., Kong, M. H., & Oh, Y. H. (2020). Sedentary lifestyle: Overview of Updated Evidence of Potential Health Risks. *Korean Journal of Family Medicine*, *41*(6), 365–373. https://doi.org/10.4082/kjfm.20.0165

Pearson, N., Braithwaite, R. E., Biddle, S. J. H., van Sluijs, E. M. F., & Atkin, A. J. (2014). Associations between sedentary behaviour and physical activity in children and adolescents: a meta-analysis. Obesity Reviews, 15(8), 666–675. https://doi.org/10.1111/obr.12188

Prince, S. A., Reid, R. D., Bernick, J., Clarke, A. E., & Reed, J. L. (2018). Single versus multi-item self-assessment of sedentary behaviour: A comparison with objectively measured sedentary time in nurses. *Journal of Science and Medicine in Sport*, *21*(9), 925–929. https://doi.org/10.1016/j.jsams.2018.01.018

Ross, R., Chaput, J.-P., Giangregorio, L. M., Janssen, I., Saunders, T. J., Kho, M. E., Poitras, V. J., Tomasone, J. R., El-Kotob, R., McLaughlin, E. C., Duggan, M., Carrier, J., Carson, V., Chastin, S. F., Latimer-Cheung, A. E., Chulak-Bozzer, T., Faulkner, G., Flood, S. M., Gazendam, M. K., & Healy, G. N. (2020). Canadian 24-Hour Movement Guidelines for Adults aged 18–64 years and Adults aged 65 years or older: an integration of physical activity, sedentary behaviour, and sleep. *Applied Physiology, Nutrition, and Metabolism*, *45*(10 (Suppl. 2)), S57–S102. https://doi.org/10.1139/apnm-2020-0467

Tanaka, C., Tanaka, M., Inoue, S., Okuda, M., & Tanaka, S. (2019). Gender differences in physical activity and sedentary behavior of Japanese primary school children during school cleaning time, morning recess and lunch recess. BMC Public Health, 19(1). https://doi.org/10.1186/s12889-019-7256-5

Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., Chastin, S. F. M., Altenburg, T. M., & Chinapaw, M. J. M. (2017). Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome. *International Journal of Behavioral Nutrition and Physical Activity*, *14*(1). https://doi.org/10.1186/s12966-017-0525-8

Van der Ploeg, H. P. (2012). Sitting Time and All-Cause Mortality Risk in 222 497 Australian Adults. Archives of Internal Medicine, 172(6), 494. https://doi.org/10.1001/archinternmed.2011.2174

Van Sluijs, E. M. F., Page, A., Ommundsen, Y., & Griffin, S. J. (2008). Behavioural and social correlates of sedentary time in young people. British Journal of Sports Medicine, 44(10), 747–755. https://doi.org/10.1136/bjsm.2008.049783

World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour. World Health Organization.

ZRS Koper. (2023, November 10). *"Sedenje ubija?!"* ZRS Koper. https://www.zrs-kp.si/novice/sedenje-ubija/