The Czech Republic's 2022 Report Card on Physical Activity for Children and Youth: A rationale and comprehensive analysis

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ABSTRACT

Background/Objective: The second edition of the Czech Republic's Report Card on Physical Activity for Children and Youth was released in 2022. This paper describes the development of the Report Card and presents a comprehensive summary of the main findings.
Methods: The multi-level search strategy was developed by the national expert panel to identify the available sources that provide data related to the physical activity of Czech children and adolescents. The data were used to assign grades to ten core and two additional indicators.
Results: A total of 28 sources provided data that allowed grades to be assigned to 11 out of the 12 indicators. Grade B was assigned to six indicators (School: B+, Community and Environment: B, Organized Sport and Physical Activity: B−, Active Transportation: B−, Family and Peers: B−, Sleep: B−), grade C to three indicators (Overall Physical Activity: C+, Active Play: C, Physical Literacy: C), and grade D to two indicators (Government: D+, Sedentary Behaviors: D). No grade for the "Physical Fitness" indicator could be assigned due to a lack of data collected in the reference period 2018−2019.
Conclusions: Although the family, school, and built environment provided a variety of opportunities to be physically active, a high proportion of children and adolescents did not meet the current physical activity guideline and were exposed to excessive sedentary behavior. A multisectoral and multidisciplinary response is required to reduce the health and economic burden of physical inactivity and excessive sedentary behavior among Czech children and adolescents.

1. Introduction

Global estimates revealed that more than four fifths of adolescents do not meet the recommended amount of physical activity (PA),[1] that is, 60 min of moderate-to-vigorous PA a day on average.[2] An insufficient level of PA (i.e., physical inactivity) causes 6−10% of the major non-communicable diseases and leads to an elevated premature mortality rate and high economic burden.[3,4] Due to its high global prevalence, physical inactivity has been recognized as a global pandemic and one of the main public health challenges currently facing the world.[5] Regarding the fact that the World Health Organization (WHO) is aware of the health and economic risks associated with the high levels of physical inactivity, it adopted the goal of reducing its global prevalence by 15% by 2030.[6] To achieve this global target, the WHO has defined four strategic objectives that can be achieved through 20 policy actions and has also emphasized the role of surveillance systems to track progress towards the global target.[6]

A comprehensive surveillance system is a crucial source of data on the prevalence of physical inactivity in the population. Likewise, it allows highlighting secular trends and helps to identify the determinants of PA. The Global Matrix on Physical Activity for Children and Youth project is one of eight intercontinental initiatives that provide international data on physical inactivity levels among children and adolescents.[7] This project is led by the Active Healthy Kids Global Alliance (AHKGA) and brings together experts from

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countries around the world who follow a harmonized process and, based on the synthesis of available evidence, inform experts, policy makers, and other stakeholders about the current levels of PA and their main determinants.[8]

The Czech Republic joined the initiative in 2018 and published its first Report Card[9,10] which summarized ten indicators based on the synthesis of the national PA-related data collected between 2013 and 2017. Despite the fact that a plethora of research on PA of Czech children and adolescents have been conducted in the last two decades,[11] this was the first attempt to estimate the national level of physical inactivity based on a synthesis of the most recent available evidence. Therefore, the Report Card partly compensates for the lack of a standardized national surveillance system and informs about the prevalence of physical inactivity among Czech children and adolescents, identifies the main PA determinants, recognizes research gaps, and provides an opportunity for international comparison.[8,12]

In 2022, the second edition of the Czech Republic's Report Card[13] was released as part of the fourth generation of the Global Matrix on Physical Activity for Children and Youth project. The current Report Card provides the updated grades for the ten core indicators and extends the previous Report Card[9,10] by assigning grades for the two additional indicators ("Sleep" and "Physical Literacy"), by providing sub-grades for the sex and age categories, and by presenting the differences in grades between the previous and current Report Cards. To support national PA surveillance in Czech children and adolescents, this paper (1) presents a comprehensive summary and analysis of grades for the twelve PA-related indicators along with a rationale for the assignment of grades, (2) attempts to analyze the differences between sex and age groups, and (3) offers a comparison of grades assigned in the previous and current Report Cards.

2. Methods

2.1. National expert panel

The Czech Republic's 2022 Report Card[13] (Figure A1) was developed by an expert panel consisting of ten researchers from Palacký University Olomouc (coordination center) and the Technical University of Liberec. The national expert panel was established in mid-2020 and its main responsibilities were to 1) gather all available sources of information including PA-related data collected in the reference period (2018—2019), 2) identify relevant sources for data extraction, 3) synthesize the data to grade indicators, 4) make a consensus on grade assignment, and 5) develop and release the Report Card.

2.2. Indicators and benchmarks

The Report Card assigned grades for the ten core indicators selected by the AHKGA.[8] The list of indicators included six behavioral indicators ("Overall Physical Activity", "Organized Sport and Physical Activity", "Active Play", "Active Transportation", "Sedentary Behaviors", and "Physical Fitness") and four source of influence indicators ("Family and Peers", "School", "Community and Environment", and "Government"). Furthermore, two additional behavioral indicators ("Sleep" and "Physical Literacy") were selected by the expert panel to be evaluated in the current Report Card.

2.3. Searching

A multi-level search strategy was developed to identify all available sources of information providing adequate data collected

in the reference period. First, a comprehensive search strategy for the Medline database (via Ovid) was developed. The search syntax was built using the Medical Subject Headings, keywords, and free-text terms. The search strategy was further transformed to search for articles indexed in the Medvik database (www.medvik.cz). Second, the National Repository of Grey Literature (www.nusl.cz) and the government databases (www.databaze-strategie.cz) were searched for government documents (i.e., grey literature). Third, handsearching through articles published in the reference period in six Czech journals whose scope included topics related to PA was also conducted. The following Czech journals were included: Česká kinantropologie, Česko-slovenská pediatrie, Medicina Sportiva Bohemica et Slovaca, Studia Kinanthropologica, Studia Sportiva, and Tělesná kultura. Finally, the expert panel identified experts from all of the regions of the Czech Republic who were invited to suggest published or unpublished data to be used for the assessment of the indicators.

All of the records identified by the search strategy were imported into EndNote X9 (Thomson Reuters, San Francisco, CA, USA) and any duplicates were removed. Then, an online Excel spreadsheet containing the identification number of each data source, name of the first author/data custodian, article/study title, year of publication/data collection, and abstract/metadata was created for screening purposes. The records identified by the search strategy were initially screened for eligibility by all of the members of the expert panel. Potentially eligible sources of information were independently screened by two reviewers. Where required, any disagreements regarding data source eligibility were resolved by discussion among the members of the expert panel to reach a consensus.

2.4. Data extraction

A data source was considered eligible for extraction if it provided data related to PA and collected between 2018 and 2019 in the target population (i.e., children [6—13 years] and adolescents [14—17 years]). An Excel spreadsheet was prepared to facilitate data extraction. The data on the proportion of children and adolescents, parents, schools, or municipalities that met a specific benchmark were extracted from eligible sources of information. Whenever possible, data were extracted for the total sample and separately for the sex and age categories. Furthermore, the following information was also extracted: 1) descriptive characteristics (sample size, proportion of girls, average age of participants), 2) year and region of data collection, 3) type of methods used to obtain outcomes of interest, and 4) additional information (coordinating institution, funding). All of the data extracted were verified by the members of the expert panel prior to the data analysis.

2.5. Grading and quality assessment

A set of standardized benchmarks corresponding to each of the indicators (Table A1) was used to guide the grade assignment process. The benchmarks for the core indicators were provided by the AHKGA[8] while the benchmarks for the "Sleep" and "Physical Literacy" indicators were prepared and designed by the national expert panel. An average score weighted by the sample size was calculated for each indicator and was further consulted with the grade rubric to assign a specific grade. The following grade rubric was used: A+ (94—100%), A (87—93%), A— (80—86%), B+ (74—79%), B (67—73%), B— (60—66%), C+ (54—59%), C (47—53%), C— (40—46%), D+ (34—39%), D (27—33%), D— (20—26%) and F (<20%). The indicator was graded as "INC" (incomplete data) if there was a lack of relevant data for its evaluation. A draft of the grades along with their rationale were audited by members of the AHKGA Executive

Committee and were approved in November 2021.

The methodological quality of the included data sources was evaluated using a 9-item assessment tool. This pragmatic tool was developed by the national expert panel and comprises seven items related to the study population (e.g., participant recruitment, sample size, proportion of girls, age range) and two items related to the assessment of the outcomes of interest (e.g., the validity of the method used to obtain PA-related data). Except for the government documents, the data sources were scored according to the degree to which the specific criteria were met (0 = "no", 1 = "yes"). A quality score was calculated for each data source and used to classify the level of methodological quality as follows: high (7–9 points), medium (4–6 points), low (2 or 3 points), and insufficient quality (<2 points).

3. Results

A total of 692 scientific articles, government documents, and unpublished datasets were identified by a multi-level search strategy (Figure A2). After duplicates were removed, 636 unique data sources remained that were screened for eligibility. After titles, abstracts, and/or metadata were screened at level 1, 30 sources were retained for level 2 screening. Finally, the remaining 28 data sources passed the level 2 screening and were included in the final analysis (Table A2). The main reasons for exclusion were the absence of PA-related data for benchmark assessment, absence of the target population, and data collection outside the observed period. Out of the 28 data sources included in the analysis, 12 were scientific articles,[14–25] 6 were government documents,[26–31] and 10 were unpublished data from available datasets. The data sources included in the analysis provided data for the evaluation of 21 out of 34 benchmarks (Table A1) which allowed assigning grades to 11 out of 12 indicators.

The corresponding grades for the indicators included in the Report Card are listed in Table 1. In total, grade B was assigned to 6 indicators, grade C to 3 indicators, and grade D to 2 indicators. The grade for the "Physical Fitness" indicator could not be assigned due to a lack of data. A notable difference between boys and girls was found for the "Sedentary Behaviors" indicator (F vs. D+). The grade for the "Overall Physical Activity" (B− vs. C), "Organized Sport and Physical Activity" (B vs. C+), and "Family and Peers" indicator (B vs. C) differed between children and adolescents. When compared with the grades of the previous Report Card,[9,10] the grades for the "Active Play" indicator notably increased, whilst the grades for the "Overall Physical Activity" and "Government" indicators decreased (Table 2).

The average quality score for the included data sources was 6.7

out of 9 points. A total of 5 grades ("Overall Physical Activity", "Organized Sport and Physical Activity", "Active Transportation", "School", and "Community and Environment") were assigned using high quality data sources while the remaining grades were assigned using medium quality data sources. All of the indicators were graded using data sources of an average quality score of at least 6.2 points (Figure A3).

4. Discussion

The grades for the second edition of the Czech Republic's Report Card were assigned using the data from multiple sources. Although slightly more than half of Czech children and adolescents met the current PA guideline, more than two thirds reported excessive screen time. Most children and adolescents participated in organized sport and PA, took part in unorganized PA and active play in their free time, and actively commuted to school. Sleep health and the level of physical literacy appear to be adequate in most children and adolescents. The analysis showed that the family, school and built environment offered opportunities for children and adolescents to be physically active. The grade for the "Sedentary Behaviors" indicator differed between boys and girls, whilst age-related differences were found for the "Overall Physical Activity", "Organized Sport and Physical Activity", and "Family and Peers" indicators. The absence of the topic of promoting PA in key government documents is alarming. The grade for the "Physical Fitness" indicator was not assigned due to a lack of data.

Table 2
Comparison of the grades for the core indicators between the previous and current Report Cards.

Indicator	2018	2022
Overall Physical Activity	D	F[a]
Organized Sport and Physical Activity	B−	B−
Active Play	D−	C
Active Transportation	C+	B−
Sedentary Behaviors	D−	D
Physical Fitness	C+	INC
Family and Peers	C+	B−
School	B+	B+
Community and Environment	B	B
Government	C+	D+

INC − incomplete grade, NA − not assigned.
[a] For comparison purposes, the self-reported data were reanalyzed using the benchmark from the previous Report Card (i.e., percentage of children and youth who meet the PA guidelines on all days of the week).

Table 1
Grades for the indicators included in the Czech Republic's 2022 Report Card stratified by age and sex.

Indicator	Total	Children	Adolescents	Boys	Girls
Overall Physical Activity	C+	B−	C	B−	C+
Organized Sport and Physical Activity	B−	B	C+	B	B−
Active Play	C	C	C+	C	C
Active Transportation	B−	B−	B−	B−	B−
Sedentary Behaviors	D	D	D−	F	D+
Physical Fitness	INC	INC	INC	INC	INC
Family and Peers	B−	B	C	B−	B−
School	B+	NA	NA	NA	NA
Community and Environment	B	B	B−	B	B
Government	D+	NA	NA	NA	NA
Sleep	B−	B−	B−	B−	B−
Physical Literacy	C	C+	C	C	C

INC − incomplete grade, NA − not assigned.
Age categories: children (6–13 years), adolescents (14 and older).

4.1. Overall Physical Activity

The assessment of the "Overall Physical Activity" indicator was based on the data from four cross-sectional studies with a representative pooled sample of 16 240 children and adolescents. Source data were predominantly self-reported and collected using the Health Behavior in School-Aged Children (HBSC) study and the Youth Activity Profile questionnaire. Device-based data were obtained from 885 children and adolescents using hip and wrist-worn accelerometers. In total, 58% of children and adolescents met the PA guideline of an average of ≥60 min/day of device-measured moderate-to-vigorous PA or at least 4 days with ≥60 min of self-reported moderate-to-vigorous PA. A notable difference was observed between device-based (27%) and self-reported (60%) estimates of the prevalence of meeting the PA guideline. Our findings on age differences in meeting the PA guideline are in line with previous studies confirming that children are more active than adolescents.[32]

The comparability of the grades assigned in the previous[9,10] and current Report Card is limited due to the different benchmark used to estimate the self-reported prevalence of meeting the PA guideline. The benchmark of the percentage of children and adolescents who met the PA guideline on at least 4 days a week was used in the current Report Card, while the benchmark of every day a week was used in the previous Report Card. If the benchmark from the previous Report Card had been applied to current data, the grade would have decreased from C+ to F. This finding reveals the continued negative trend in meeting the PA guideline identified among school-aged children in the HBSC study in the previous decade.[33]

Another finding is that the source data used to assign the grade differed between the previous and current Report Cards. There is an apparent shift in data collection in the studies assessing device-measured PA. While all of the studies included in the previous Report Card collected data using hip-worn accelerometers during waking time, the studies included in the current Report Card used wrist-worn accelerometers and a 24-h wear protocol. Furthermore, the absence of self-report data from the International Physical Activity Questionnaire was also apparent.

4.2. Organized Sport and Physical Activity

The indicator assessment was based on three studies with a total of 13 900 participants. Approximately 66% of Czech children and adolescents participated in organized sports activities or other organized PA-oriented programs. As in the previous Report Card,[9,10] grade B− was attributed to this indicator. Although this finding indicates that children's participation in organized sport and PA has not changed over time, an important limitation needs to be discussed. In the previous and current Report Cards, the vast majority of the data was acquired from the HBSC study, which pays attention to school-aged children aged 11–15 years. For this reason, our findings could not be generalized to all Czech children and adolescents. Therefore, future studies should investigate the level of participation in organized sport and PA at all ages. One potential source of data to help bridge this gap might be the database from the National Sports Agency which records nationwide data on the participation of children and adolescents in organized sport and PA. To use the data from the database, it will be necessary to modify the nature of the data collected as it does not provide any information about duration and frequency. Likewise, the database should cover all organizations dealing with organized sports and PA in the Czech Republic as it currently includes only organizations that apply for government funding.

An interesting finding comes from the comparison between the

age and sex categories. It was revealed that children (72%) and boys (71%) participated in organized sport and PA at higher rates than adolescents (57%) and girls (61%), respectively. One possible explanation for this finding is that leisure-time programs are not designed to consider preferences and potential barriers to participation in organized sport and PA. Respecting these factors is one of the easiest ways to develop the commitment to lifelong PA and an active lifestyle.[34] Besides providing equal opportunities regardless of socioeconomic and health status, our findings highlight the need to design leisure-time programs that would appeal across sex and age categories.

4.3. Active play

The "Active Play" indicator was graded using the data from three studies totaling 3097 children and adolescents from 9 of 14 regions of the Czech Republic. Around 53% of children and adolescents reported participating in unorganized PA or active play for at least 2 h of their free time a day. This represents almost two-fold higher estimates compared with the previous Report Card.[9,10] However, the grade comparison should be interpreted with caution due to the high heterogeneity in the source data. The current grade was assigned based on the data collected as part of three cross-sectional studies with a relatively large pooled sample, whilst the data from the pilot survey among 175 participants were analyzed in the previous Report Card. Furthermore, the data for the current analysis were collected during various seasons of the year and in most regions of the Czech Republic. Thus, the present results are descriptive in nature and future studies are warranted to provide a deeper understanding of the longitudinal trends in unorganized PA and active play among Czech children and adolescents.

It is also worth mentioning that notable differences were observed between the included studies as their estimates ranged from 11% to 67%. A possible explanation for this finding may be the absence of standardized tools to assess this specific domain of PA which could be a potential cause of heterogeneity of the methods used in the included studies. The topic of "active play" seems to have been under-researched as was the case in most of the countries that participated in the previous generation of the Global Matrix project.[8] Additionally, the second benchmark, that is, the percentage of children and adolescents who report being outdoors for more than 2 h a day, has not been evaluated at all. To the best of our knowledge, no relevant studies have been published in the Czech Republic so far. Future research should therefore strive to promote this area in terms of both methodology soundness and empirical research.

4.4. Active transportation

The data on active transport of children and adolescents were provided by four studies with a pooled sample of 16 134 participants. The source data were collected through questionnaire surveys on the predominant form of transportation to and from school. Two thirds of Czech children and adolescents reported that they use mostly active forms of transport (i.e., walking, cycling, riding a kick scooter or skateboard) to or from school. Compared with the estimates from the previous Report Card,[9,10] the proportion of active transport to or from school increased from 59% to 66%.

The expert panel assumes that the increase in the proportion of children and adolescents who use active transportation to and from school reflects the actual increase in this phenomenon. This assumption is supported by the fact that the nature of the source data used to assign grades in the previous and current Report Cards is very similar. The only noteworthy differences could be considered the wider age range analyzed in the current Report Card and

the use of the extended active transportation construct which allows identifying active commuters riding a skateboard or kick scooter. One of the potential causes for the increase in the proportion of active commuters may be specific government actions and interventions based on the "National cycling development strategy".[31] However, the effects of such actions and interventions remain unknown as a comprehensive analysis of their impact has not been conducted so far.

It has to be admitted that the data sources used to analyze the indicator do not cover the entire construct because the information on active transportation to other places (e.g., park, mall, friend's house, out-of-school activities) was not collected in the reference period. A better understanding of the entire construct is necessary to develop effective intervention strategies to promote PA through active transportation. Such strategies have the potential to improve the level of PA of school-aged children because a pilot analysis revealed that active transportation contributed to daily moderate-to-vigorous PA by 25% among Czech adolescents.[35] Therefore, the expert panel calls for a more comprehensive analysis of active transportation based on spatial localization (e.g., using GPS) to better understand its role in the lifestyle of children and adolescents and to help identify its urban and environmental determinants. Furthermore, this information can help policymakers and planners address the needs of children and adolescents and guide them in designing safe infrastructure for active travel.

4.5. Sedentary Behaviors

The findings of five cross-sectional studies with a pooled sample size of 15 254 participants were used to assign a grade to this indicator. The primary source was self-reported data from the HBSC study ($n > 12\,000$). In total, 29% of children and adolescents met the screen time guideline as they reported less than 2 h of recreational screen time per day. A notable difference in the adherence to the screen time guideline was found between the sex categories. Specifically, a higher proportion of girls (39%) met the guideline compared with boys (19%). It was also found that children were more likely to meet the guideline compared with adolescents. The low adherence to the guideline and the presence of sex- and age-specific differences highlight the need for effective intervention strategies. In the light of the above-mentioned findings, the initial target population should be adolescent boys who are at the highest risk of excessive screen time. The recent study[36] in Czech children and adolescents revealed that an increase in leisure-time PA at the expense of time spent in sedentary behavior could be a possible strategy to prevent health problems (e.g., excess adiposity) associated with excessive screen time.

Compared with the estimates from the previous Report Card,[9,10] an increase was observed in children and adolescents who met the screen time guideline by six percent points. However, this optimistic finding should be interpreted with caution because estimates from the previous and current Report Cards could differ due to the high heterogeneity and quality of the included studies. The different quality of the included studies draws attention to a more accurate assessment of screen time, especially in close connection with other parts of 24-h movement behaviors (i.e., PA of various intensities and sleep). Furthermore, surveillance appears to be insufficient in individuals younger than 11 years and older than 15 years as most of the data come from the HBSC study. To bridge this gap, the expert panel suggests that future studies should consider implementing objective screen time assessment techniques or at least questionnaires with exclusively continuous screen time variables and focusing on samples with a wider age range.

4.6. Physical fitness

In the reference period, only one published study[18] provided relevant data to evaluate the benchmark. This regional study collected data on cardiorespiratory fitness in a small sample ($n = 254$) of children aged 9–11 years. Another regional study[37] was conducted during the reference period but it was excluded due to the impossibility to estimate the average percentile from the international normative values.[38] Thus, the expert panel decided not to assign a grade to the "Physical Fitness" indicator due to insufficient data.

When comparing the amount of data included in the current and previous Report Cards,[9,10] an unsystematic fitness surveillance among children and adolescents was apparent. While only one study[18] was available in the reference period, the grade C+ was assigned in the previous Report Card based on the analysis of several studies with a pooled sample of >12 000 children and adolescents recruited from across all regions of the Czech Republic. Furthermore, the high heterogeneity in the test systems used for the assessment of physical fitness has also been evident in the last decades.[39] The inconsistency in physical fitness research makes comparison between studies difficult and limits the comparison with international normative values. Therefore, the expert panel calls for the harmonization of assessment tools and for a nationwide systematic surveillance of physical fitness.

4.7. Family and Peers

Grade B− was assigned to this indicator based on the analysis of unpublished data collected as part of the HBSC study and two other regional studies. The available sources of information provided data for an analysis of two of the five benchmarks. Approximately 66% of children and adolescents reported that they were physically active together with parents or that their parents facilitated PA and sport opportunities for them. Children (74%) were more likely to report joint parent-child PA or parental support for participation in PA and sport compared with adolescents (53%).

Although the role of the family in the lifestyle behaviors of children and adolescents has received considerable research attention worldwide,[40] this topic seems to be unexplored in the Czech Republic. Likewise in the previous report Card,[9,10] the HBSC study was the main data source (representing 95% of all data analyzed) which allowed evaluating two of the five benchmarks. Only two other regional studies comprising small sample sizes were conducted in the reference period. For this reason, more research is needed to describe the degree of family influence on the PA level among Czech children and adolescents. Therefore, future research should draw attention to parental adherence to PA guidelines and the level of support and encouragement toward participation in PA between children and their peers and friends. Similarly, the expert panel recommends prioritizing a device-measured assessment of joint parent-child PA and incorporating proximity data (e.g., GPS, Bluetooth signal) to identify the time that children and their parents spend together.

4.8. School

The indicator assessment was based on representative data on PA opportunities, active school policy, access to school PA facilities, and number of physical education lessons. The data were provided by more than 200 schools across all regions of the Czech Republic and collected during 2018 as part of the HBSC survey. Compared with the previous Report Card,[9,10] no national survey of the Czech School Inspectorate was carried out in the reference period. Therefore, the current analysis is limited to four of the six

benchmarks. The results of the analysis do not indicate a significant change in the grade assigned to this indicator in the previous Report Card.

Active school policy was reported in 85% of schools, with the promotion of active commuting to and from school being most common. Approximately 83% of schools were PA-friendly and offered opportunities for PA during school hours, recesses, and after school. Most students had regular access to facilities that support PA in 87% of schools. The expert panel considers the development of effective school-based interventions and PA promotion in the context of teaching as the biggest challenge for school policy in the coming years. The awareness of the health benefits of PA should also be an essential part of the preparation of qualified educators so that even non-PE specialists can incorporate some physical exercises into school classes. According to recent international recommendations,[41] replacing sedentary learning with movement-based learning activities might be a potential strategy to support health and wellbeing of children and adolescents. The potential of school-based PA was also recognized by the Czech School Inspectorate,[42] which recently published a document on ways to help schools promote PA. Another source of support for authorities and policy planners comes from the WHO which published documents for the development of active school policies.[43,44] Unfortunately, these publications often do not reach those in charge. More action is needed to help schools through stakeholders and to facilitate their work to create effective active policy.

4.9. Community and Environment

The unpublished data from two cross-sectional studies carried out in 2018 were used to assign a grade for the "Community and Environment" indicator. Nearly 70% of Czech children and adolescents reported that they had a place near their residence where they could play and considered the surroundings of their residence safe for PA. Although the sample sizes differed between the included studies, their estimates were consistent and similar to those reported in the previous Report Card.[9,10] Despite the relatively large pooled sample size ($n = 13\ 788$), our findings should be interpreted with caution. Compared with the previous Report Card, objective data on the urban environment was not available in the reference period. Thus, the grade for this indicator was assigned based on the subjective perceptions which may lead to biased estimates of the built environment.[45] Moreover, the findings cannot be generalized to all Czech children and adolescents because the vast majority of data come from the HBSC study, which surveys school-aged children between 11 and 15 years of age.

It should also be noted that included studies provided data for the assessment of two of the six benchmarks. In the Czech Republic, large-scale studies using objective methods focusing on the availability of facilities and features of the built environment or studies focusing on community policy or infrastructure promoting PA among Czech children and adolescents are still lacking. Evidence-based planning of the built environment and communities that support an active lifestyle is the strategic objective of the WHO "Global action plan on physical activity".[6] This global public health need has been particularly intensified in the last two years when spatial closures started to be imposed due to the COVID-19 pandemic. Never in modern history has such a large group of people been dependent on the quality of their neighborhood for such a long period of time. Research on the influence of environment and community on PA is thus a very topical issue which seems to have been under-researched in the Czech Republic. Therefore, the expert panel calls for more research on this topic.

4.10. Government

The grade for this indicator was assigned based on a content analysis of six government documents published by the Ministry of Education, Youth and Sports,[26] Ministry of Health of the Czech Republic,[27,28] National Sports Agency,[29,30] and Ministry of Transport of the Czech Republic.[31] The expert panel concluded that the Czech Republic had not taken the opportunity offered by the implementation of the national strategies "Health 2020"[46,47] and "Sports Promotion Concept 2016–2025"[29] drafted in the previous reference period (2013–2017). Therefore, the expert panel has decided to downgrade from C+ to D+ because the score of two of the three benchmarks significantly deteriorated compared with the previous Report Card.[9,10]

Just as in the previous reference period,[9,10] the Czech Republic still lacks the key strategic documents and a multi-sectoral approach to promoting PA. The topic of habitual PA is neglected in the available strategic documents as most of the current PA promoting activities are limited to the promotion of competitive sport. Additionally, existing strategies lack an implementation plan with defined responsibilities for achieving the objectives with controllable timelines and links to the budget. It should also be done at various levels of public administration, as is the case in Slovenia, for example.[48] To date, several policy actions have been taken to promote PA among children and adolescents; however, no analysis of their effectiveness and sustainability has been carried out. The Czech Republic also lacks a regular analysis of the economic burden of physical inactivity, which could serve as an eye-opening argument for policymakers when conceiving public health policy. This analysis was conducted in 2008[49] and has not been replicated so far.

It is important to mention that the evaluation of the "Government" indicator was subjective and based on the experience and practice of the members of the expert panel. The expert panel collectively believes that the evaluation of the indicator requires a more comprehensive and meaningful policy analysis and suggests utilizing the adapted version of the Policy Audit Tool version 2[50] in the next Report Card.

4.11. Sleep

It was the first time that the "Sleep" indicator was assessed in the Czech Republic's Report Card. The expert panel proposed three benchmarks (Table A1) that allowed the indicator to be evaluated. Based on a consensus of the expert panel, eligible data sources were defined as any published and unpublished data collected in the period 2015–2019 reporting on sleep duration, quality of sleep, and prevalence of sleep disorders. Device-based, self-reported, and parent proxy-reported data from three published[16,19,25] and two unpublished datasets with a pooled sample of >16 000 children and adolescents were analyzed. Grade B− was attributed to this indicator because almost 65% of children and adolescents had optimal sleep health as they reported adequate sleep duration, good sleep quality, and did not suffer from severe sleep disorders.

All of the data sources included in the analysis reported on the duration of sleep which allows estimating the proportion of children and adolescents who meet the National Sleep Foundation guideline[51] for optimal sleep duration (9–11 h for children and 8–10 h for adolescents). To our knowledge, such an analysis has not been published for the Czech pediatric population. It was found that nearly 56% of children and adolescents met the guideline but the estimated prevalence differed between the data sources in which different types of data collection were used. The highest prevalence of children and adolescents with optimal sleep duration was found for the sources based on parental proxy-reported data

(95%)[25] while the lowest prevalence (28%) was obvious for the sources derived from device-based data.[19] Most of the data sources used to assess this benchmark were based on self-reported data ($n = 13\,992$). Of these data sources, the estimated prevalence was 53%. Considering the significant difference between the estimated prevalence from different data sources, the expert panel suggests prioritizing a device-based assessment of sleep duration in future studies.

Limited data were available for the assessment of the remaining two benchmarks related to sleep quality and prevalence of sleep disorders. A study by Rubín et al.[19] used accelerometer-based data to assess sleep quality among 679 children and adolescents. The authors found that 67% of participants had good sleep quality and that a greater proportion of girls (73%) and adolescents (74%) had good sleep quality compared with boys (58%) and children (60%), respectively. Only one data source was available to assess the proportion of children and adolescents with sleep disturbances. Based on an analysis of the unpublished data from the HBSC study, approximately 24% of children and adolescents reported difficulties falling asleep at least once per month. Furthermore, girls (28%) reported difficulties falling asleep more frequently than boys (20%). The findings presented in the Report Card highlight the need for prevention strategies to prevent health consequences of sleep disorders among the pediatric population.

4.12. Physical literacy

As in the case of the "Sleep" indicator, the "Physical Literacy" indicator was included in the Report Card for the first time. Four benchmarks related to motivation for engagement in PA, performance of practicing PA in various settings, awareness and knowledge of PA guidelines, and level of movement competencies were proposed by the expert panel (Table A1). The indicator assessment was based on direct-measured ($n = 950$) and self-reported data ($n = 4253$) provided by seven unpublished datasets which included data collected in the period 2015−2019. Overall, 52% of children and adolescents showed an optimal level of physical literacy which corresponds to grade C.

To our knowledge, this is the first analysis that attempted to comprehensively evaluate the level of physical literacy of Czech children and adolescents. Only a few studies on physical literacy have been published in the past decade in the Czech Republic.[52−54] However, these studies did not provide a comprehensive analysis because they concentrated only on a specific component of physical literacy and comprised small sample sizes. Another strength of our analysis is that it includes studies that provided direct-measured data on movement competencies. On the other hand, these unpublished studies were limited to relatively small samples, covered a narrow age range, and used various types of testing batteries to assess movement competencies (i.e., BOT 2, MABC-2, and MOBAK). These issues affected the quality of the included studies and may have led to biased estimates. Therefore, the expert panel calls for the use of uniform movement competency testing and for data collection among various age groups in all of the regions of the Czech Republic.

Other interesting findings were revealed based on the evaluation of the individual benchmarks. Sex- and age-specific differences were found for motivation to participate in PA. Specifically, boys (52%) and children (52%) were more likely to be motivated to participate in PA compared with girls (43%) and adolescents (44%), respectively. Approximately 62% and 74% of children and adolescents were able engage in PA in various settings and had an optimal level of movement competencies, respectively. In contrast, only 14% of children and adolescents reported being aware of the current PA guideline. The lack of awareness of the recommended amount of PA

is alarming and may be one of the causes of the relatively high prevalence of physical inactivity among Czech children and adolescents. Regarding the fact that it is well known that individuals must be accurately aware of the action to be able to initiate change,[55] the expert panel collectively suggests developing effective communication strategies and PA promotion campaigns to increase PA participation among Czech children and adolescents.

4.13. The impact of the previous Report Card

The Report Card is designed to consolidate and translate research knowledge to raise awareness about the importance of PA in daily life and drive social and policy action to reduce the prevalence of physical inactivity among children and adolescents.[56] The official Czech Republic's Report Card webpage (www.activehealthykids.cz) is the primary medium for disseminating information to the general population and stakeholders. It contains the official version of the Report Card, infographics, and links to main scientific articles presenting the national and global findings. The data on the number of page visits between the release of the previous and current Report Card showed that the Report Card might have helped raise awareness about the importance of PA, as nearly 3000 page visits were found (Figure A4). Additionally, the analysis of page visits revealed a few periods with significantly increased visits. The first peak in page visits is associated with the official release of the Report Card in late-May 2019. The remaining peaks in page visits are probably associated with the increase in the population-level interest in engagement with PA shown during the COVID-19 lockdowns in high-income countries.[57] In addition to official webpage visits, 13 individual online news stories (i.e., media hits) were also generated.

The findings from the previous Report Card have also received attention in the national research community. In total, four scientific articles presenting the main findings from the Czech Republic's Report Card and international analysis have been published.[8−10,12] These articles accumulated over 390 citations on the Web of Science. It was found that 37 of all citations came from 22 scientific articles with at least one author/co-author from the Czech Republic (Table A3). Moreover, the official version of the Report Card, freely available on the official webpage, accumulated 12 citations on Google Scholar from the master and dissertation theses.

Although it seems that the first Czech Republic's Report Card has helped raise awareness among the general population, research community, and stakeholders, its impact on research gap surveillance and policy actions was negligible. This is evidenced by an increase in the "INC" grade, decreased number of benchmarks with available data for assessment of the core indicators, and a lack of the topic of PA promotion in key strategic documents. Thus, future activities are needed to stimulate debate about the importance of PA in daily life and to motivate policymakers and stakeholders to appropriate action.

5. Conclusions

The second edition of the Czech Republic's Report Card was developed using the representative data covering the entire age range and collected from all regions of the Czech Republic which allow generalizing the results to the general population of children and adolescents. The Report Card showed that the family, school, and built environment provided a variety of opportunities for children and adolescents to be physically active. Furthermore, high levels of participation in organized and unorganized physical activities and the high proportion of active commuters and those with an adequate level of sleep health and physical literacy were found. Although it seems that Czech children and adolescents have a

variety of opportunities to participate in PA, a relatively high proportion of them did not meet the current PA guideline and were exposed to excessive sedentary behavior. In the light of this finding, the national expert panel calls for urgent action to identify the main causes of the disparities between support structures (e.g., policy actions, public health programs, physical education curriculum, infrastructure for PA) and the level of PA and encourages the development of a national strategy to address them. Therefore, the national expert panel identified the following priorities to guide experts, policymakers, and other stakeholders toward this goal.

1. Update the national strategy to increase PA among children and adolescents and develop a follow-up action plan including the implementation process and funding.
2. Establish and develop a national surveillance system to assess the level of PA, track trends, and identify the key factors influencing PA among children and adolescents.
3. Develop evidence-based programs and support their implementation at the state, regional, municipal, and school levels. Actions to strengthen the offers for active leisure and active mobility should be an important part of the programs.
4. Evaluate the effectiveness of policy actions and programs based on the data from the national surveillance system to provide data for their innovation and optimization.
5. Bridge government departments, sports organizations, universities, and the scientific community into an action platform for cooperation in promoting PA among children and adolescents.
6. Launch a communication campaign focusing on the health, social, economic, and environmental benefits of regular PA. Promote lifelong learning for educators and health professionals to increase their knowledge and competence in promoting an active lifestyle.

Support statement

Author statement

Aleš Gába: Conceptualization; Methodology; Formal analysis; Resources; Data Curation; Writing - Original Draft; Project administration. **Petr Baďura**: Conceptualization; Formal analysis; Resources; Writing - Original Draft. **Michal Vorlíček**: Conceptualization; Formal analysis; Resources; Writing - Original Draft. **Jan Dygrýn**: Resources; Writing - Review & Editing. **Hamřík Zdeněk**: Resources; Writing - Review & Editing. **Michal Kudláček**: Resources; Writing - Review & Editing. **Lukáš Rubín**: Resources; Writing - Review & Editing. **Erik Sigmund**: Resources; Writing - Review & Editing. **Dagmar Sigmundová**: Resources; Writing - Review & Editing. **Jana Vašíčková**: Resources; Writing - Review & Editing.

Declaration of competing interest

The authors have no conflicts of interest to declare regarding the content of this manuscript.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesf.2022.08.002.

References

1. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc Health.* 2020;4:23—35. https://doi.org/10.1016/S2352-4642(19)30323-2.
2. World Health Organization. *WHO Guidelines on Physical Activity and Sedentary Behaviour.* Geneva: World Health Organisation; 2020.
3. Ding D, Lawson KD, Kolbe-Alexander TL, et al. The economic burden of physical inactivity: a global analysis of major non-communicable diseases. *Lancet.* 2016;388:1311—1324. https://doi.org/10.1016/S0140-6736(16)30383-X.
4. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet.* 2012;380:219—229. https://doi.org/10.1016/S0140-6736(12)61031-9.
5. Kohl 3rd HW, Craig CL, Lambert EV, et al. The pandemic of physical inactivity: global action for public health. *Lancet.* 2012;380:294—305. https://doi.org/10.1016/S0140-6736(12)60898-8.
6. World Health Organization. *Global Action Plan on Physical Activity 2018—2030: More Active People for a Healthier World.* Geneva: World Health Organization; 2018.
7. Aubert S, Brazo-Sayavera J, González SA, et al. Global prevalence of physical activity for children and adolescents; inconsistencies, research gaps, and recommendations: a narrative review. *Int J Behav Nutr Phys Act.* 2021;18:81. https://doi.org/10.1186/s12966-021-01155-2.
8. Aubert S, Barnes JD, Abdeta C, et al. Global Matrix 3.0 physical activity report card grades for children and youth: results and analysis from 49 countries. *J Phys Act Health.* 2018;15:S251—S273. https://doi.org/10.1123/jpah.2018-0472.
9. Gába A, Rubín L, Badura P, et al. Results from the Czech Republic's 2018 report card on physical activity for children and youth. *J Phys Act Health.* 2018;15: S338—S340. https://doi.org/10.1123/jpah.2018-0508.
10. Gába A, Rubín L, Sigmund E, et al. Executive summary of the Czech Republic's 2018 report card on physical activity for children and youth. *Acta Gymn.* 2019;49:92—102. https://doi.org/10.5507/ag.2019.007.
11. Materová E, Pelclová J, Gába A, Frömel K. Surveillance of physical activity and sedentary behaviour in Czech children and adolescents: a scoping review of the literature from the past two decades. *BMC Public Health.* 2022;22:363. https://doi.org/10.1186/s12889-022-12766-0.
12. Aubert S, Barnes JD, Aguilar-Farias N, et al. Report Card grades on the physical activity of children and youth comparing 30 very high human development index countries. *J Phys Act Health.* 2018;15:S298—S314. https://doi.org/10.1123/jpah.2018-0431.
13. Active Healthy Kids Czech Republic. Národní zpráva o pohybové aktivitě českých dětí a mládeže 2022. *Olomouc: Univerzita Palackého v Olomouci.* 2022. https://doi.org/10.5507/ftk.22.24461069. Available from.
14. Cuberek R, Janíková M, Dygrýn J. Adaptation and validation of the physical activity questionnaire for older children (PAQ-C) among Czech children. *PLoS One.* 2021;16, e0245256. https://doi.org/10.1371/journal.pone.0245256.
15. Gába A, Dygrýn J, Štefelová N, et al. How do short sleepers use extra waking hours? A compositional analysis of 24-h time-use patterns among children and adolescents. *Int J Behav Nutr Phys Act.* 2020;17:104. https://doi.org/10.1186/s12966-020-01004-8.
16. Gariepy G, Danna S, Gobiņa I, et al. How are adolescents sleeping? Adolescent sleep patterns and sociodemographic differences in 24 European and North American countries. *J Adolesc Health.* 2020;66:S81—S88. https://doi.org/10.1016/j.jadohealth.2020.03.013.
17. Jakubec L, Gába A, Dygrýn J, Rubín L, Šimůnek A, Sigmund E. Is adherence to the 24-hour movement guidelines associated with a reduced risk of adiposity among children and adolescents? *BMC Public Health.* 2020;20:1119. https://doi.org/10.1186/s12889-020-09213-3.
18. Musálek M, Clark CCT, Kokštejn J, Vokounova Š, Hnízdil J, Mess F. Impaired cardiorespiratory fitness and muscle strength in children with normal-weight obesity. *Int J Environ Res Public Health.* 2020;17. https://doi.org/10.3390/ijerph17249198.
19. Rubín L, Gába A, Dygrýn J, Jakubec L, Materová E, Vencálek O. Prevalence and correlates of adherence to the combined movement guidelines among Czech children and adolescents. *BMC Public Health.* 2020;20:1692. https://doi.org/10.1186/s12889-020-09802-2.
20. Sigmund E, Baďura P, Sigmundová D, Chmelík F, Hamřík Z. Overweight and

obesity in children in re-lation to physical activity and excessive body weight in their parents. *Prakt Lek.* 2020;100:83–87.

21. Sigmund E, Sigmundová D, Badura P. Excessive body weight of children and adolescents in the spotlight of their parents' overweight and obesity, physical activity, and screen time. *Int J Pub Health.* 2020;65:1309–1317. https://doi.org/10.1007/s00038-020-01419-x.

22. Sigmund E, Sigmundová D, Badura P, et al. Time-trends and correlates of obesity in Czech adolescents in relation to family socioeconomic status over a 16-year study period (2002–2018). *BMC Public Health.* 2020;20:229. https://doi.org/10.1186/s12889-020-8336-2.

23. Sigmundová D, Badura P, Sigmund E. Parent–child dyads and nuclear family association in pedometer-assessed physical activity: a cross-sectional study of 4-to-16-year-old Czech children. *Eur J Sports Exerc Sci.* 2021;21:1314–1325. https://doi.org/10.1080/17461391.2020.1833086.

24. Sigmundová D, Sigmund E, Badura P, Hollein T. Parent-child physical activity association in families with 4- to 16-year-old children. *Int J Environ Res Public Health.* 2020;17. https://doi.org/10.3390/ijerph17114015.

25. Whiting S, Buoncristiano M, Gelius P, et al. Physical activity, screen time, and sleep duration of children aged 6–9 Years in 25 countries: an analysis within the WHO European Childhood Obesity Surveillance Initiative (COSI) 2015–2017. *Obes Facts.* 2021;14:32–44. https://doi.org/10.1159/000511263.

26. Ministry of Education, Youth and Sports. *Strategie vzdělávací politiky České republiky do roku 2030+ Prague.* Ministry of Education, Youth and Sports; 2020. Available from: https://www.msmt.cz/uploads/Brozura_S2030_online_CZ.pdf.

27. *Ministry of Health of the Czech Republic. Zdraví 2030 – Strategický rámec rozvoje péče o zdraví v České republice do roku 2030.* Prague: Ministry of Health of the Czech Republic; 2019. Available from: https://www.mzcr.cz/wp-content/uploads/wepub/18700/40551/Zdravi2030_FINAL16122019.pdf.pdf.

28. *Ministry of Health of the Czech Republic. Zdraví 2030 – Strategický rámec rozvoje péče o zdraví v České republice do roku 2030 - Implementační plán č. 1.2 Prevence nemocí, podpora a ochrana zdraví; zvyšování zdravotní gramotnosti.* Prague: Ministry of Health of the Czech Republic; 2020. Available from: https://www.mzcr.cz/verejna-konzultace-k-aktualizovanym-implementacnim-planum-strategickeho-ramce-zdravi-2030/.

29. National Sports Agency. *Koncepce podpory sportu 2016-2025.* Prague: National Sports Agency; 2021. Available from: https://agenturasport.cz/specificke-dokumenty/.

30. National Sports Agency. *Akční plán ke koncepci Sport 2025 na období 2020 - 2021.* Prague: National Sports Agency; 2021. Available from: https://agenturasport.cz/specificke-dokumenty/.

31. *Ministry of Transport of Czech Republic. Národní strategie rozvoje cyklistické dopravy ČR 2013–2020.* Ministry of Transport of Czech Republic; 2013. Available from: https://www.databaze-strategie.cz/cz/md/strategie/narodni-strategie-rozvoje-cyklisticke-dopravy-cr-pro-leta-2013-az-2020.

32. Steene-Johannessen J, Hansen BH, Dalene KE, et al. Variations in accelerometry measured physical activity and sedentary time across Europe – harmonized analyses of 47,497 children and adolescents. *Int J Behav Nutr Phys Act.* 2020;17:38. https://doi.org/10.1186/s12966-020-00930-x.

33. Kalman M, Inchley J, Sigmundova D, et al. Secular trends in moderate-to-vigorous physical activity in 32 countries from 2002 to 2010: a cross-national perspective. *Eur J Public Health.* 2015;25:37–40. https://doi.org/10.1093/eurpub/ckv024.

34. McEvoy E, MacPhail A, Enright E. Physical activity experiences of young people in an area of disadvantage: 'there's nothing there for big kids, like us. *Sport Educ Soc.* 2016;21:1161–1175. https://doi.org/10.1080/13573322.2014.994176.

35. Vorlíček M. *Spatio-temporal localization of physical activity of Czech adolescents in the context of behavioral changes* [doctoral thesis]. *Olomouc: Faculty of Physical Culture, Palacký University Olomouc.* 2020.

36. Gába A, Dygrýn J, Štefelová N, Rubín L, Hron K, Jakubec L. Replacing school and out-of-school sedentary behaviors with physical activity and its associations with adiposity in children and adolescents: a compositional isotemporal substitution analysis. *Environ Health Prev Med.* 2021;26:16. https://doi.org/10.1186/s12199-021-00932-6.

37. Košik P. *Srovnání motorické úrovně pohybově aktivních a inaktivních dětí 5. tříd Plzeňského kraje a Svobodného státu Sasko [doctoral thesis].* Pilsen, University of West Bohemia; 2020.

38. Tomkinson GR, Carver KD, Atkinson F, et al. European normative values for physical fitness in children and adolescents aged 9–17 years: results from 2 779 165 Eurofit performances representing 30 countries. *Br J Sports Med.* 2018;52:1445–1456. https://doi.org/10.1136/bjsports-2017-098253.

39. Rubín L, Suchomel A, Kupr J. Aktuální možnosti hodnocení tělesné zdatnosti u jedinců školního věku. *Čes kinantropol.* 2014;18:11–22.

40. Rhodes RE, Guerrero MD, Vanderloo LM, et al. Development of a consensus statement on the role of the family in the physical activity, sedentary, and sleep behaviours of children and youth. *Int J Behav Nutr Phys Act.* 2020;17:74. https://doi.org/10.1186/s12966-020-00973-0.

41. Saunders TJ, Rollo S, Kuzik N, et al. International school-related sedentary behaviour recommendations for children and youth. *Int J Behav Nutr Phys Act.* 2022;19:39. https://doi.org/10.1186/s12966-022-01259-3.

42. Maleňáková Š, Zatloukal T, Andrys O, Vašíčková J, Vlček P. *Inspirace pro podporu pohybových dovedností žáků v rámci různých školních aktivit.* Prague: Czech School Inspectorate; 2021. Available from: https://csicr.cz/Csicr/media/Prilohy/2021_p%c5%99%c3%adlohy/Lev%c3%a9%20menu/Metodicke-doporuceni-Pohybove-aktivity_brezen-2021.pdf.

43. World Health Organization. *Promoting Physical Activity through Schools: A Toolkit.* Geneva: World Health Organization; 2021, 2021. Available from: https://apps.who.int/iris/handle/10665/350836.

44. World Health Organization. *Promoting Physical Activity in Schools : An Important Element of a Health-Promoting School.* Geneva: World Health Organization; 2007. Available from: https://apps.who.int/iris/handle/10665/43733.

45. Poulsen MN, Knapp EA, Hirsch AG, Bailey-Davis L, Pollak J, Schwartz BS. Comparing objective measures of the built environment in their associations with youth physical activity and sedentary behavior across heterogeneous geographies. *Health Place.* 2018;49:30–38. https://doi.org/10.1016/j.healthplace.2017.11.003.

46. Ministry of Health of the Czech Republic. Zdraví 2020 – Národní strategie ochrany a podpory zdraví a prevence nemocí. *Ministry of Health of the Czech Republic;* 2014. Available from: https://www.mzcr.cz/Verejne/dokumenty/zdravi-2020-narodni-strategie-ochranya-podpory-zdravi-a-prevence-nemoci_8690_3016_5.html.

47. Ministry of Health of the Czech Republic. Zdraví 2020 – Národní strategie ochrany a podpory zdraví a prevence nemocí (AP č. 01: Podpora pohybové aktivity). *Ministerstvo zdravotnictví České republiky;* 2015. Available from: https://www.databaze-strategie.cz/cz/mzd/strategie/podpora-pohybove-aktivity-na-obdobi-2015-2020?typ=o.

48. Sember V, Morrison SA, Jurak G, et al. Results from Slovenia's 2018 report card on. *Physical Activity for Children and Youth.* 2018;15:S404–S405. https://doi.org/10.1123/jpah.2018-0542.

49. Maresova K. The costs of physical inactivity in the Czech Republic in 2008. *J Phys Act Health.* 2014;11:489–494. https://doi.org/10.1123/jpah.2012-0165.

50. Ward MR, Tyler R, Edwards LC, Miller MC, Williams S, Stratton G. The AHK-Wales Report Card 2018: policy Measures - is it possible to 'score' qualitative data? *Health Promot Int.* 2021;36:1151–1159. https://doi.org/10.1093/heapro/daaa118.

51. Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health.* 2015;1:40–43. https://doi.org/10.1016/j.sleh.2014.12.010.

52. Vašíčková J, Cuberek R, Pernicová H. Reliabilita dotazníku sebehodnocení pohybové gramotnosti u vysokoškolské populace. *Těl kult.* 2020;43:6–15. https://doi.org/10.5507/tk.2020.007.

53. Šimůnková I, Novotná V, Vorálková J. Struktura složek pohybové gramotnosti pro sportovní odvětví moderní gymnastika. *Stud Kinantropologia.* 2010;11:110–117.

54. Šafaříková J. Vytváření pohybové gramotnosti žáků 1. stupně ZŠ. *Těl vých sport mlád.* 2010;76:43–45.

55. Prentice-Dunn S, Rogers RW. Protection motivation theory and preventive health: beyond the health belief model. *Health Educ Res.* 1986;1:153–161. https://doi.org/10.1093/her/1.3.153.

56. Colley RC, Brownrigg M, Tremblay MS. A model of knowledge translation in health. *Health Promot Pract.* 2012;13:320–330. https://doi.org/10.1177/1524839911432929.

57. Ding D, del Pozo Cruz B, Green MA, Bauman AE. Is the COVID-19 lockdown nudging people to be more active: a big data analysis. *Br J Sports Med.* 2020;54:1183. https://doi.org/10.1136/bjsports-2020-102575.