Article

The associations of physical activity and sedentary behaviour with mental health in a nationwide sample of Kazakhstan adolescents

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Abstract: As mental health problems tend to increase during adolescence and is a serious public health issue in the Republic of Kazakhstan. Early detection is necessary and monitoring at the population level can be used to evaluate the progress of national programmes promoting positive well-being. Physical activity (PA) can be protective whereas increased screen time behaviours (STB) can be a risk for low levels of well-being. A national representative sample (n=4,731) of young adolescents aged 11y, 13y, and 15y from the Republic of Kazakhstan took part in the WHO collaborative Health Behaviour in School-aged Children (HBSC) study. Respondents completed the WHO-5 Well-being scale, and items in on PA and STB. Internationally recognised, recommended cut-offs were used for analyses. Two models of binary logistic regressions were performed to examine the associations with PA (Model 1) and PA with STB (Model 2) after stratification by gender and controlling for age, locality and family affluence. Three quarters of young adolescents in the Republic of Kazakhstan have good overall well-being, despite the proportion reduces as adolescents age from 11y to 15y (boys, OR=0.66 CI=0.49-0.80; girls, OR=0.55, CI=0.43-0.71). The odds ratio for positive well-being were more than twice for boys and more than 3.5 for girls who reported daily PA than not being active daily. Spending less time on STB for girls was associated with positive well-being than spending more STB time (OR=1.28, CI=1.04-1.59). Well-being among young adolescents drops dramatically between the ages of 11y and 15y and is higher among rural schools attendees than in urban schools. The recommended amounts of PA can be protective of low well-being for both boys and girls. However, meeting reporting STB recommendations was only protective for girls and not boys. Designing and implementing positive well-being programmes require consideration of locality and amounts of PA and STB.

Keywords: WHO-5; Well-being; School-aged Children; HBSC study; Rural; Urban, Locality

1. Introduction

Social, physical and mental changes during young adolescence (11-15 years) can make individuals vulnerable to mental health problems. In the Republic of Kazakhstan, poor mental health and suicide are serious public health issues [1]. Between 1990-2009, boys in the Republic of Kazakhstan aged between 10-14 years had the highest suicide rate in the world, and girls ranked fourth highest [2]. According to figures reported by the WHO, the average in the European region is

14.1 deaths by suicide per 100,000, whereas the suicide rate for men and boys is 48.1 per 100,000, although the rate for girls is remarkably lower at 9.6 [3]. The WHO report, Health for the World's Adolescents [4] suggested mental health and well-being programmes were often lacking investment and overlooked. In response to this, pilot programmes in the Republic of Kazakhstan to promote psychological well-being were operationalised between 2015-2017 [1]. As such, monitoring of adolescent's perceptions of psychological well-being in the Republic of Kazakhstan would be valuable in understanding how well such programmes are working, gauge existing levels and to track changes over time.

The Health Behaviour in School-aged Children (HBSC) study was carried out for the first time in the Republic of Kazakhstan during the 2017/18 data collection cycle. The HBSC study has grown from a three country European study in 1982 to a pan European study as a WHO collaborative study, including many countries in the European region and North America [5]. The HBSC study focuses on the social determinants of health as well as carrying out measures on health behaviours [6]. At the last international report (2013/14 data), there was data from 44 countries and regions where the same measures and methods were used to allow international comparisons as well as within national trends that can be used to inform policy for health and well-being [7]. The inclusion of the Republic of Kazakhstan for the 2017/18 data collection round expands the number of countries as well as the breadth of young adolescents involved with the international report forthcoming.

The role of energy expenditure behaviours on well-being

The international recommendation for physical activity (PA) among young adolescents is at least 60 minutes of moderate-to-vigorous PA (MVPA) per day [8]. The benefits of meeting these recommendations also extended to the areas of mental health and well-being [9]. Opportunities to take part in MVPA include different contexts including, but not limited to physical education and leisure time activities, organised or unorganised. In the Republic of Kazakhstan, physical education has been mandated since 2012 for three lessons per week [10] however, one in six schools across the country do not have their own sports hall or gymnasium [11]. According to a national survey, 88.7% of young adolescents attended physical education classes and 65.3% take part in leisure time PA [12], although fewer take part in organised leisure time PA from low-income families [13]. To address these inequities, investment has increased by 4% in sport facilities around the country between 2014 and 2017 [11]. The national programme called "Densaulyk" is the current health promotion programme (2016-2019) whereby increases in PA are one of its outcomes [14].

Cross-sectional studies repeatedly found positive associations in PA and positive mental health [15, 16]. In addition, intervention studies have had small but significant effects on improvements in mental health, such as a reduction in depression [17] and increases in health-related quality of life [18]. There were also positive improvements in emotional well-being through PA interventions among particular target groups such as individual's at-risk youth [19]. The mechanisms to explain increased levels of PA with improvements in well-being could be in relation to the association between obesity and well-being. Hoare and colleagues [20], reviewed the literature and concluded that increases of PA can reduce severity of obesity among individuals and this could influence improvements in individuals' perceptions of well-being. In other studies, there is a strong correlation between taking part in organised sports and high levels of physical activity [21], and perhaps it is through participation in sport clubs where well-being benefits are most noticeable [22].

At the other end of the energy expenditure spectrum, sedentary behaviours among adolescents typically involve screen time behaviours (STBs) such as watching the television, playing computer games and carrying out activities on the computer [23, 24]. Excessive STB among adolescents can have negative effects in mental health [25], and a consensus on what counts as excess has led recommendations set at a daily limit of 2 hours per day for young adolescents [26, 27]. Almost half of the young adolescents in the Republic of Kazakhstan spend up to two hours of TV per day, and 54.5% spent over two hours per day on the computer [12]. Researchers have also reported the association between increased levels of STB and low levels of well-being exists among young adolescents [28]. According to Hoare and colleagues [29], there is strong evidence for the relationship

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between STBs and depression, and moderate evidence for low self-esteem. However, the choose of activities also increased as young people progress through adolescence and start to do different activities through online mechanisms [30] such as searching for information online, using the internet for school work and listening to music videos, of which, may be used to increase well-being thus, reducing the effects from previous research.

Current changes to STB and PA in the Republic of Kazakhstan leads to uncertainty of PA and STBs on well-being. Therefore, the aims of this study are to examine the associations between PA and STBs with well-being among young adolescents in the Republic of Kazakhstan. Based on the previous literature, we expect to find associations between increased levels of PA and well-being. We also expect to see increased levels of STBs would be negatively associated with well-being.

2. Materials and Methods

National data in the Republic of Kazakhstan from the WHO cross-national collaborative HBSC study was analysed in this study. The ethical approval was received from the Local ethic commission of the National Center for Problems of Healthy Lifestyle Development, the Ministry of Health of the Republic of Kazakhstan, Protocol №9, dated August 3, 2017.

Sample

The HBSC study is based on the survey of school-aged children, where the design of the study suggests a cross-section cluster sample targeting age groups;11, 13, 15 years old [31]. According to the statistical compilation of the Republic of Kazakhstan 2016, the number of children aged 11, 13 and 15 was 722,185 individuals [32].

To implement the HBSC study selection process in the Republic of Kazakhstan, a two-stage cluster sampling was used with schools as primary sampling units and a random selection of classes in schools (secondary sampling units). At the second stage, classes from the list of all suitable classes were randomly selected from each school with equal probability. The sample unit is equal to one class, i.e. the whole class is polled and investigated, regardless of how old the child is. Stratification was carried out on a geographical basis, and individual regions of the republic and cities of national importance acted as a stratification unit. To form a representative sample, registration lists of schools were compiled for each of the 14 regions of the republic and two cities of national significance - Nur-Sultan and Almaty. Sampling was made by age. It was established that the majority of children in any one age group correspond to the same school class. The 5th, 7th and 9th grades participated in the survey.

The inclusion criteria for selecting schools were based on public schools in which children of 5-9 grades study. Small-scale schools are excluded from the sample, in which the number of pupils in a class is less than 10 people or primary school children of all levels are taught together in one class, as well as private schools, boarding schools and specialized schools for children with special needs, in which less than 1, 0% of the target population.

Sample Calculation with Resampling

The planned number of school children for the survey is 6,480 people (three age categories). More details of the calculation can be found in Appendix A. From of the sampling, 110 schools were selected, where it was planned to collect not less than 6,534 pupils of 5, 7 and 9 grades from 54 schools from urban areas and56 schools from rural areas. The sampling of the number of schools in individual regions was also carried out following the principles of proportionality (Table 1).

Table 1. Number of included schools in the Republic of Kazakhstan by region

Region	Total (n)	Urban (n)	Rural (n)
Akmola oblast	5	2	3
Aktobe oblast	6	3	3
Almaty oblast	11	3	8

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Atyrau oblast	5	2	3
West-Kazakhstan	5	2	3
Zhambyl oblast	9	3	6
Karaganda oblast	8	6	2
Kostanay oblast	5	3	2
Kyzylorda oblast	7	3	4
Mangystau oblast	6	2	4
Turkistan oblast	12	4	8
Pavlodar oblast	5	3	2
North-Kazakhstan oblast	5	2	3
East-Kazakhstan oblast	7	2	5
Nur-Sultan	6	6	0
Almaty	8	8	0
Total	**110**	**54**	**56**

Survey items

Gender and age: Respondents reported their gender as boy or girl and no other options were available at the time of the survey. The young adolescents reported their month and year of birth and age was then calculated based on the date for when the survey was completed. Three age groups were used for the analyses between 11y (reference group), 13y and 15y olds.

Socio-economic status: We used a proxy measure of social economic status by asking six questions about material wealth and calculating it relatively through the Family affluence scale (FASIII) [33]. FAS measures material family wealth as an indicator of absolute level of socio-economic position and asks about concrete possessions (i.e. number of family cars; computers), characteristics of the home (i.e. Having a bedroom for one own; number of bathrooms; owning a dishwasher), and the number of family holidays in the last year. The scores are summed up (range 0 to 13). The absolute Family Affluence Scale Scores (0 = lowest affluence, 13 = highest affluence) were then transformed into a Ridit-based trichotomous variable separating children from families within the lowest 20% (reference category), the medium 60%, and the highest 20% affluence categories [34].

Locality: A code was created for the location of the school based on the address of the school. Urban or a rural setting was coded, where urban was the reference category.

Well-being

Well-being was measured by the WHO-5 Well-being Index [35]. The WHO-5 is a short, self-administered questionnaire covering five items, related to positive mood, vitality, and general interests (i.e. “I have felt cheerful and in good spirits”; “I have felt calm and relaxed”) with response options ranging from (0)”At no time” to (5) “All the time”. Scores range from 0–25. A score of ≥13 is often used to indicate good well-being and participants with scores ≥13 were classified as having good overall well-being [35]. Against DSM-IV depression, the sensitivity for adolescents was 0.74 and specificity was 0.89 when using the cut-off score of 13 and below [36]. We determined a cut-off score of 13 for good overall well-being and below 13 for low well-being. To explore the associations with positive well-being, the binary coding for WHO-5 was zero for low well-being, and 1 for good overall well-being. For this study, the Cronbach’s alpha for these items was 0.75.

Physical Activity

A single item based on the previous week recall was used to measure physical activity [37]. Respondents read a description of PA and examples of moderate-to-vigorous physical activity (MVPA). Then, there was a question of how many days the individual has been physically active for more than a total of 60 minutes in a day. The response options were the number of days in the past week, i.e. from 0 to 7 days. The item has acceptable intra-rater reliability among same age adolescents

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[38] and acceptable validity for monitoring at national level of children who meet the physical activity recommendations of at least 60 minutes of MVPA per day [39, 40]. The variable was dichotomised into not daily MVPA (0-6 days) as the reference category and daily MVPA (7 days).

Screen time behaviours

Screen time behaviour items were combined from three items concerning the average amount of time per day television viewing, using a computer, and computer gaming during the school week. Response options ranged from "none at all", "about half an hour", then "about 1 hour per day" to "about 7 hours per day" with one-hour time intervals for each response category. The recommendation of screen time is less than 2 hours per day [27]. To allow for simultaneous screen usage, the time reported on the three screen time behaviours were added and the cut off was based on 3h or less, with more than three hours as the reference category. This combined STB use has been used with other HBSC data [41]. The validity of self-report STB items is challenging and have not been carried out [42] however, there is acceptable intra-rater reliability among young adolescents [43-45].

Analyses

All analyses were carried out on IBM SPSS 20.0. The data were analysed for descriptive differences by gender and tested through Chi-square test of independence. Independent T-tests were performed to examine the differences in well-being by locality. Multiple binary logistic regression analyses were performed with well-being as the outcome variable after stratifying by gender. Model 1 examined the association between daily MVPA with well-being. Model 2 included the adjusted recommended screen time threshold with model 2. All models were adjusted by age (by categories), family affluence and locality (urban vs rural).

3. Results

Three quarters (74.9%) of adolescents in the Republic of Kazakhstan had good overall well-being. Significantly more (p<.001) adolescents from rural localities (79.3%) than urban localities (72.8%) reported good overall well-being. Gender and age categories were evenly distributed between urban and rural settings. There were however, differences in family affluence (p<.001) whereby one in five (19.0%) of adolescents in urban locations reported low FAS, compared with 36.7% of rural adolescents, and almost one in four (23.5%) urban adolescents had high FAS compared to 8.5% in rural locations.

Only a third (33.3%) of the population met the PA recommendations and just under half (45.5%) reported to spend less than 3h per day of screen time behaviours (STB) during weekdays (Table 2). There were significantly more (x2=19.9; p<.001) young adolescents in rural areas (37.9%) who met the PA recommendations than those in urban locations (31.6%). Similarly, the differences were the same for meeting the adjusted STB (rural=50.9% vs urban 41.0%, X2=45.5, p<.001). There were significantly more boys than girls who met the PA (36.5% vs 32.4%, p=0.003) but slightly fewer boys met the STB (44.0% v 46.9%, p=0.048) recommendations. A larger proportion of girls reported low FAS (29.1%) than boys (25.0%), thus the difference in distribution of FAS was statistically significant between boys and girls (p=0.006). The differences between boys and girls in distributions of rural and urban, as well as good and low well-being were not statistically significant.

Table 2. Description of the sample

	Total N	Colum %	Male %	Female %	Chi-Square p
Total	4731		50.6	49.4	
Age					.362
11y	1634	34.8	35.2	34.4	

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13y	1522	32.4	32.9	31.9	
15y	1541	32.8	31.8	33.8	
Locality					0.093
Urban	2602	55.0	53.8	56.2	
Rural	2129	45.0	46.2	43.8	
Family Affluence					0.006
Low	1249	26.4	25.0	29.1	
Medium	2608	55.1	58.1	54.7	
High	766	16.2	16.9	16.2	
Well-being					0.300
Low	1131	23.9	23.6	24.9	
High	3530	74.6	76.4	75.1	
Physical Activity					0.003
Not Daily	2995	63.3	63.5	67.6	
Daily	1574	33.3	36.5	32.4	
Screen Time					0.048
>= 3h	2522	54.5	56.0	53.1	
< 3hr	2102	45.5	44.0	46.9	

Chi-square test of independence between gender for each variable.

Associations with well-being

After controlling for age, FAS and school's location, twice as many boys and over three times as many girls were likely to report daily physical activity and good well-being (Table 3). After adding recommendations for STB in model 2, the odds ratios did not differ too much, even though boys' STB was not statistically significant in the model. For girls, meeting the STB recommendations was associated with good well-being (OR=1.24, 1.04-1.59, p=.021). Model 2 had a slightly better fit than Model 1 for girls, as the Naegelkerke r2 increased from r2=0.098 to r2=0.103, whereas for boys the model's fit lowered marginally from r2= 0.052 to r2=0.050.

Table 3. Adjusted Binary Logistic regression models on WB, model 1 (PA) & 2 (PA & STB) for Good overall well-being

	Male		Female	
	Model 1	Model 2	Model 1	Model 2
Age				
11 y	ref	ref	ref	ref

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13 y	0.83 (0.64-1.06)	0.85 (0.66-1.10)	0.71 (0.55-0.93)	0.73 (0.56-0.95)
15 y	0.62 (0.49-0.80)	0.66 (0.51-0.85)	0.55 (0.43-0.71)	0.57 (0.44-0.73)
Locality				
Urban	ref	ref	ref	ref
Rural	1.48 (1.20-1.83)	1.45 (1.17-1.80)	1.41 (1.14-1.75)	1.38 (1.11-1.71)
MVPA				
Not Daily	ref	ref	ref	ref
Daily	2.16 (1.72-2.71)	2.17 (1.72-2.73)	3.58 (2.75-4.65)	3.54 (2.71-4.61)
STB week days				
>= 3hr		ref		ref
< 3hr		1.02 (0.83-1.26)		1.28 (1.04-1.59)
Family Affluence	1.13 (0.78-1.63)	1.15 (0.79-1.68))	1.30 (0.91-1.87)	1.32 (0.91-1.91)
Nagelkerke R2	0.052	0.050	0.098	0.103

Note: Reference categories, Residency = Urban, MVPA = non-daily, STB = 3hr or more, Age = 11y. Continuous variables; relative FAS from low FAS score increasing upwards

4. Discussion

In this study, we examined the associations between physical activity behaviours and mental health in a national representative sample of young adolescents in the Republic of Kazakhstan. The data were collected using an internationally recognised protocol through the HBSC study [31]. We found MVPA was strongly associated with positive well-being and among girls, keeping to recommended levels of STB were also positively associated with well-being.

A clear pattern appeared from the results from our study. As age increased, there was a rapid decline in good overall well-being. The reduction in overall wellbeing has been linked with the young adolescents growing older to seek independence, lessen family involvement in the daily lives as well as taking part in more risk behaviours [46]. In addition, the increasing choice of activities to be carried out on the computer can increase the time spent on STBs, especially among mid teenagers [30] and some more findings suggest clear associations with low levels of well-being exist [28, 29, 47]. In addition, there is a decline in PA levels as age increases and increasing PA can be protective of well-being [17].

From our study, we found a stronger association between well-being with PA than with STB. The combination of increasing PA and decreasing STBs was only associated among girls, highlighting differences between boys' and girls' well-being. The associations between PA and STB with well-being were significant for girls, and only PA for boys. The strength of the association of well-being and PA behaviour was stronger among girls than boys despite fewer girls met the PA recommendations than boys. Given the differences in well-being between boys and girls were not statistically significant, the results would suggest the importance of these behaviours, especially for girls.

One aspect we were not expecting was the lack of significant differences in well-being between boys and girls. Previous studies suggest girls have lower levels of well-being than boys [48], and the

gap between boys and girls may be explained by PA [16]. A correlate of well-being is health complaints, and recent studies suggest girls report more health complaints than boys, implying well-being would be lower among girls than boys [49]. Yet, in our study, the differences were negligible. The differences in what WHO-5 measures from than health complaints requires further examination in the overall perspective of mental health. It is likely the WHO-5 can be used as a screener for low emotional well-being and depressive affects [50], hence would cover only part of the overall mental health sphere.

The levels of PA and STB were in the similar realms among young adolescents in the Republic of Kazakhstan than in many other countries. If this was placed in the PA report card grades, the levels would be D for PA and C- for STB, which is exactly equivalent to the grades reported in India, Lebanon, Portugal, and Uruguay [51]. Like in most countries, more effort is needed to increase PA and decrease STB levels in the Republic of Kazakhstan. As PA is a protective factor of well-being, a systems approach to PA promotion is a needed holistic approach to enable all young adolescents the opportunities to be physically active [52].

Of particular interest, was the positive association between living in rural compared with urban areas and high well-being. One explanation of this result could be urban related behaviours among children in the Republic of Kazakhstan aged 7-10 years old include more STB and thus higher rates of overweight and obesity than their peers in rural settings [53]. There could be a trajectory to go into young adolescents. Research from Western countries found the opposite association whereas adolescents from rural settings are more likely to report poor well-being [54]. Similar associations highlight urban adolescents to have good well-being were observed in non-Western countries (i.e. China [55]). Moreover, systematic research from Western countries has shown that children growing up in rural settings engage in less healthy behaviours [56]. There is a lack in interdisciplinary approaches that highlight the complexity of urban structures and dynamics and their possible influence on urban health and well-being. Future research ought to explore in more depth if this is the case in the Republic of Kazakhstan where the norms around health behaviours could be different in these rural settings.

This study also expands the current evidence with regards to WHO-5 as a measure of well-being. Previous research has shown the WHO-5 instrument can be used as a screening instrument for adolescent depression both in Western countries [57], and non-western contexts [58], as well as an overall indicator of adolescent well-being [36]. These results confirms suggestions that WHO-5 Well-being index can be used a well-being indicator of adolescent health in the Republic of Kazakhstan. Whether this instrument is a reliable measure for depression within Kazakhstan context ought to be explored by future research.

Well-being is a proxy for many areas under self-perceptions of health. It is a short measure of positive well-being and is used from a strength- based approach [35]. These aspects are important to understand, and further examination is required to explore these associations with other areas of mental health, such as depression, loneliness, and so forth. Increasing levels of PA and reducing STB have been associated with improvements in mental health (5,13). The strength-based approach to mental health and its associations with energy expenditure behaviours requires more in-depth knowledge that goes beyond this study. To reinforce good well-being, it is only one aspect of mental health [59]. In Ireland, the well-being curriculum is a cross subject discipline over the span of the junior cycle (12-15years old), consisting of currently 300 hours in the three years. The plan is to expand this to 400 hours [60]. Although physical education contributes to it, other areas need to be reinforced to meet the amount of teaching hours associated with well-being. In the Republic of Kazakhstan, the hours of mandated physical education are greater than in Ireland, although other aspects such as being mindful, refreshed and spirited need to also be considered when taking into accounts well-being. The challenges presented to adolescents to maintain good overall well-being are constantly changing, and in recent times, technology and social media are playing an important role in the lives [47]. Studies suggest that as young adolescent get older, they participate more in online activities [30] and may also have positive characteristics thus, adding another layer of complexity to this type of research.

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Study limitations

The way data were collected was through school-based surveys and this it is not known how well the procedures were followed by teachers during data collection. Although the WHO-5 is a measure of mental health, the items only cover one of the dimensions of mental health, mainly the positive aspects of mental health. Therefore, other aspects of mental health such as depression, psychosis, loneliness and others were not reported in this study. Self-reported behaviours including PA and STB may not be entirely accurate and reporting bias needs to be considered when interpreting the results. The use of cut-offs based on the international recommendations does not allow for the subtle differences in the changes of behaviour. For example, knowing the difference of one more day in a week of 60 minutes of PA can be supported through data collection through PA measuring devices (e.g. accelerometer). These research designs come at a large expense when collecting the device-based PA because each participant would need to carry their device with them, typically for a week. The data was cross-sectional; hence we are unable to make causal inferences between the dependent and independent variables. Not all confounders were examined in the models because we were interested in the behaviours of PA and STB.

5. Conclusions

Regular PA at least 60 minutes per day and reduced STB are proven to be beneficial for mental well-being of adolescents in the context of the Republic of Kazakhstan. Considering the importance of adolescence mental health issues in the Republic of Kazakhstan, effective preventive interventions should be more comprehensive and include PA components addressing young adolescents, parents, school, social and the physical environment. In addition, the differences between school location and its association with well-being would indicate the consideration of locality during scale up and national programs with the purpose for improving well-being.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A – Sampling procedures and Data cleaning

The minimum sample size recommended for the study "Health Behaviour of School-aged Children" (HBSC) for each of the three age groups is 1,550 +/- 3%. The number of classes required for selection is determined by the recommended sample size of at least 1,550 students in each age group.

Expected Response rate and Sample Size

Failure to respond is expected at the school, class, and child levels, and each should be considered when determining the number of school classes needed to achieve the desired sample size. To account for the expected lack of response, a planned oversampling was provided for in the sampling procedure.

Planned oversampling

To ensure the desired sample size, oversampling (redefinition) of the sample was made, which is necessary for a two-stage sample. The expected non-response is taken into account by selecting more classes than is required with an ideal 100% response rate, and to deal with cases lost during data cleansing.

Sample Calculation with Resampling

In the republic, the average class size is 20 individuals. With a 100% expected response rate at each level, 1,550/20 = 78 classes will be required. But if only 90% of classes participate, the actual sample achieved will consist of only 70 classes with 1,395 students, which is lower than the desired sample size. To achieve the required actual sample of 1550 students, we had to revise the selection. The amount of resampling required is determined by the oversampling factor: 1 / (expected response percentage). If the expected response rate is 90% (p = 0.9), the resampling factor is: 1 / 0.9 = 1.11. To get a sample of 1550 schoolchildren, with an average class consisting of 20 students, you need to poll (1550/20) * (1 / 0.9) = 86 classes. Similarly, at the individual level, there may be a non-response. If only 80% of students in each class are suitable for the target age group, therefore, this information should also be included in the coefficient of over-sampling. If the expected response rate at the class level is 0.9, and the expected response rate at the individual level is 0.8, the resampling factor becomes (1 / (0.9 * 0.8)). To get a sample of 1550 schoolchildren, it was planned to examine (1550/20) * (1 / (0.9 * 0.8)) = 108, that is, at least 108 classes, which is 2160 students in each age group.

Data cleaning

From of the conducted field studies after cleaning, verification, validation of data, a database of 6546 questionnaires was formed. The average age for each age group was: 1 gr. - 11.37 years; 2 gr. - 13.35 years old; 3 gr. - 15.36 years. During the selection of the target group of children of the age group of 11 years (schoolchildren 11.37 ± 6 months) - their number was 1,525, which corresponds to 93.3% of all those selected. Also, this age category includes children of age 11.50 ± 12 months, which did not exceed 10% - i.e. children over the age of "the average age of the group is ± 6 months" (24 and 85, respectively). The final sample size for 11y olds was 1,634.

The age group of 13 years old (schoolchildren is 13.35 ± 6 months) included 1,412 people, which corresponded to 92.8%. Also, this age category included children of age 13.50 ± 12 months, which did not exceed 10% - i.e. children over the age of "the average age of the group is ± 6 months" (32 and 78, respectively). Therefore, the final sample size for the age group of 13y olds was 1,522.

The age group of 15 years old (schoolchildren 15.36 ± 6 months) included 1,413 people, which corresponded to 91.7%. Also, this age category included children of age of 15.50 ± 12 months, which did not exceed 10% - i.e. children over the age of "the average age of the group is ± 6 months" (49 and 79 people respectively). In total, there were 1541 15y olds.

Schoolchildren (n=1,813) who are not in these age ranges were excluded from the analysis. Also 2 respondents who did not indicate their gender were excluded from the analysis, thus a total of1815 responds were excluded from further analyses. The total number of the sample was 4731, which also includes 34 people who did not indicate their age (according to the requirements they are not excluded from the sample).

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