ORIGINAL ARTICLE

Physical activity and screen time among children and adolescents in Kazakhstan

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Abstract

Evidence is lacking that describe the status of physical activity (PA) behaviours among adolescents in Kazakhstan. The aims of the study are to examine the associations between PA and screen time behaviours (STB) among children and young adolescents in Kazakhstan.

Data were pooled from the 2015/16 Childhood Obesity Surveillance Initiative (COSI) study (N=4932, 49.8% girls, mean (age)=8.77 SD (age) =0.68) and the 2017/18 Health Behaviour in School-aged Children (HBSC) study (N=4153, 49.3% girls, Mean(age)=12.93 SD (age)=1.64). Both studies carried out a two-stage cluster sample to determine a national representative sample. Parental reported their children's PA levels and weekday STB time in the COSI study. In the HBSC study, young adolescents self-reported their PA levels in the past week and the amount of STB hours including TV viewing during weekdays. Data were analysed through cut-offs based on international recommendations of at least 60 minutes of moderate-to-vigorous PA and no more than two hours of screen time per day.

The number of children and young adolescents who met the PA recommendations reduced among children aged 9y (68.1%), to young adolescents aged 11y (35%), 13y (37%) and 15y (31%). Similarly, there was a reduction in the proportion of adolescents who met the STB recommendations between the ages of 9y (75%), 11y (60%), 13y (53%), and 15y (47%).

Despite some limitations in the methodologies between the COSI and HBSC surveys, and reporting of behaviours, there is a clear pattern that health promoting activities lowers as children transition into young adolescents.

Keywords physical activity • children • adolescents • sedentary behaviour.

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Introduction

Taking part in daily physical activity during childhood is protective to noncommunicable diseases (WHO, 2010). It is recommended that children and adolescents aged between 5y – 18y old take part in at least 60 minutes of moderate to vigorous physical activity (MVPA) every day to achieve benefits for physical, social and mental health (Janssen & LeBlanc, 2010). Therefore, the scientific literature defines physical inactive children and adolescents as individuals who do not meet the recommended levels of physical activity (Tremblay et al., 2017). It is during childhood that individuals typically spend the most amount of time being physically active compared to other ages (Dumith, Gigante, Domingues, & Kohl,

2011; Koski & Zacheus, 2012). Yet, as children mature into young adolescents, other behaviours and habits form such as watching television (Tremblay et al., 2011). However, because the MVPA and TV viewing behaviours are independent of each other, although these behaviours may seem to be opposite to each other (van & Hillsdon, 2017), it does not mean that individuals do not participate in sufficient MVPA if they watch excess of the recommended 2h limit of screen time per day (Battakova, 2016; Mitchell, Daniel, Schmitz, & Audrain-McGovern Janet, 2013). Despite its independence, these two behaviours are associated with obesity, poor fitness levels and low self-esteem (Tremblay et al., 2011) as well as in later life (Telama et al., 2014; Yang et al., 2018). Despite these detrimental health consequences from physical inactivity and excessive TV viewing, between 27-33% of children globally are physically active and 34-39% spend less than 2h of recreational screen time per day (Aubert et al., 2018).

The latest information that was fed into the Global Matrix 3.0 of physical activity report cards consisted of 49 countries from around the world and included a mix of countries from low, middle and high income (Aubert et al., 2018). It has served as a monitoring tool for national policy makers and can be used to see progress every two years in the participating countries. More countries are needed to provide a more comprehensive global surveillance, for example data the areas around the Caspian Sea are missing. Kazakhstan is the largest landlock country in the world with a population of under 19-Million people.

Although in Kazakhstan physical education has been mandated in the curriculum, it was not until 2012, when the number of lessons per week increased from two to three (Ministry of Culture and Sport of the Republic of Kazakhstan, 2018). The infrastructure and increased curriculum time may have contributed to the stable rate of active children and adolescents involved in out of school PA and sports at sports schools (Ministry of Culture and Sport of the Republic of Kazakhstan, 2019). About 37% of schools have a need for sports equipment. There are still some areas, particularly in rural areas whereby every fifth school does not have indoor facilities for physical education (Nurlanov et al., 2018). Based on national data on screen time of young adolescents, over half (55.3%) spent more than two hours per day watching TV (Battakova, 2016). It is not known how these behaviours act independently or dependently on physical activity levels.

The level of childhood obesity in Kazakhstan is lower than in the Western countries (WHO Regional Office for Europe, 2018). One of the action plans is the "Densaulyk" (State health development program) 2016-2019. Under such a programme, there are strategies to promote and maintain health through awareness weeks, sport events and festivals, national day, monitoring campaigns as well as specific school-aged children physical activity. The programme is implemented by the creation of videos to broadcast in two languages on multiple platforms and places, distribution of educational materials and professional development of school nurses, health care workers (President of Republic of Kazakhstan, 2016) and coincides with a 4% increase in sport facilities between 2015 and 2017 (Ministry of Culture and Sport of the Republic of Kazakhstan, 2018).

Surveillance from the effects of the infrastructure and programming changes are needed to report back to the policy makers. One way to do this is to carry out national representative surveys of children and young adolescents' level of physical activity and sedentary behaviours. As children develop into adolescents, the individual goes through many physical, social, mental changes (Hall, 1931) which needs to be considered when promoting activities such as physical activity that require bodily expression, social skills and resilience (Patton et al., 2016). Therefore, the purpose of this study is to report the levels of physical activity and sedentary behaviour from two national representative surveys in Kazakhstan (2015-2018) including children and young adolescents aged between 9 years old to 15 years old.

Method

Secondary data analyses on two studies were used for this study. The WHO European Childhood Obesity Surveillance Initiative (COSI) study had data of 8-years old. The Health Behaviour in School-aged Children – WHO Collaborative cross-national (HBSC) study had data on 11-, 13-, and 15-year olds. Both studies were national representative studies and were pooled together for analyses.

COSI data

In 2015-2016 academic year, Kazakhstan joined the fourth data collection round of the COSI study. In total, 142 schools from 7 regions, 92 urban and 50 rural schools were included in the national sample, reaching 5,537 children and 4,932 parents that participated in the study. The sample was stratified by

5 regions of Kazakhstan (Central, Northern, Southern, Western, Eastern Kazakhstan) and two cities of national importance. A two-stage cluster sample was used, with schools serving as the primary sampling units and individual classes as the secondary sampling units. A simple random sample of schools from the registration list was formed with a probability proportional to the number of schools in each region. Classes in selected schools were randomly selected from one class from each parallel, and all students in selected classes were eligible to participate in the survey.

The minimum sample size at which national representative estimates was obtained to meet the expected accuracy requirements is 2,800 children (1,400 girls and 1,400 boys) of the same age. Considering that 70% of children in the 3rd and 4th grades belong to the target age group, the total minimum number of children in the planned sample of 4,200 respondents allowed us to get the required number of children aged 9-years old.

The COSI study involves anthropometric measures on the children (9-years old data N=2918) as well as questionnaires on lifestyle factors, children's diet, family socio-economic characteristics and obesity-related comorbid disorders were completed by parents or guardians of the child (9-years old N=2564; boys = 50.7%; urban = 70.9%; rural = 29.1%). All measurements were approved by the ethics committee of the National Healthy Lifestyle Center, whereby the anthropometric measures were conducted by suitable trained professionals and the parents were fully informed about the study procedures prior to obtaining inform consent to complete the questionnaires (Battakova, 2017).

The COSI study is conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the local ethics committee at each study site. Parents were fully informed about the study procedures. In some countries, parents had to provide written signed consent to allow their children to participate in the study (opt-in consent approach) whereas other countries adopted the opt-out consent approach. On the measurement day, verbal consent from the child to participate in the study was obtained.

HBSC data

In the 2017-2018 academic year, Kazakhstan fully joined the HBSC study. Separate regions of the republic (14 oblasts) and 2 cities of national importance are represented as a stratification unit. The study was based on a two-stage cluster sampling, public schools were the primary sampling units, and classes were the secondary sampling units.

The planned sample size for each age category of 11- 13-, and 15-years old was at least 2,160 people based on the size of the minimum sample (1550), recalculated according to the resampling factor. Thus, it was determined that for each age category, 108 classes would be surveyed in 110 schools (54 schools from urban areas, 56 schools from rural ones). The size of the sample of schools in each region was based on proportional to size approach. The selection of schools and classes was done randomly. One class was selected in the fifth, seventh and ninth grade parallels.

After cleaning, verification, validation of data, the data sample was N=6548. Further checks were carried out so that only young adolescents in the targeted age categories of 11-, 13-, and 15-years old (N=4153; urban = 55.5%; rural = 44.5%) were include in the analyses (Table 1).

Table 1. COSI and HBSC Sample demographics

	Gender				Total	
	Boys		Girls			
	N	%	N	%	N	%
COSI						
9-years	1299	50.7	1265	49.3	2564	100
Rural	382	29.4	363	28.7	745	29.1
Urban	917	70.6	902	71.3	1819	70.9
HBSC						
11-years	745	35.4	725	35.4	1 470	35.4
13-years	713	33.9	649	31.7	1 362	32.8
15-years	647	30.7	674	32.9	1 321	31.8
Rural	955	54.6	893	56.4	1848	55.5
Urban	1150	45.4	1155	43.6	2305	44.5
Total	2 105	100%	2048	100	4 153	100

Participants completed the surveys voluntarily and provided assent for the data to be used for research purposes. Responses were completely anonymous and data collection was approved by the ethical committee of the National Healthy Lifestyle Center. Parental (or guardian) consent approach was used. Children were informed about their rights whether or not to participate in the survey in written form.

Instruments

COSI questions

Parents were asked to complete categorical questions about their child's usual behavior in physical activity. The question was: "In his/her free time, how many hours per day your child usually play actively/vigorously (e.g. running, jumping outside or moving and fitness games inside)?" The parents needed to respond to the question based on weekdays and weekends separately. The response options were, "never at all", "less than 1 hour per day", "About 1 hour per day", "About 2 hours per day", "About 3 or more hours per day". The data were recategorized into children who are inactive when the child spends less than 1 hour per day or never at all and categorized as active for the other three options.

Parents were also asked to complete a question about TV viewing time. The question: "Outside school lessons, how much time does your child usually spend watching TV or using electronic devices such as computer, tablet, smartphone or other electronic device (not including moving or fitness games), either at home or outside home (e.g Internet cafes, game centres etc.)?" Parents had to estimate the number of hours per day during the weekdays and separately for the weekend. Data were categorized into meeting the screen time recommendations of less than 2 hours per day (Committee on Public Education, 2001).

HBSC questions

Young adolescents completed items about overall physical activity by reading an explanation of how physical activity is defined and the intensities of the physical activity ranging from moderate to vigorous. This technique has been used in many validation studies (Hardie Murphy, Rowe, Belton, & Woods, 2015; Prochaska, Sallis, & Long, 2001) for self-reporting physical activity in surveillance studies (Biddle, Gorely, Pearson, & Bull, 2011) and has acceptable reliability properties for use among young adolescents (Bobakova et al., 2015; Liu et al., 2012; Ng et al., 2019). There was a single-item question: "Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? Please add up all the time you spent in physical activity each day." Responses ranged from zero days to seven days. Data were dichotomized into inactive adolescents for those who reported 0-6 days, and active adolescents for those who reported daily (7 days) physical activity to adhere to the WHO physical activity recommendations of daily activity.

Items related to screen time were also included in the HBSC study. The item related specifically to television use was divided into weekdays and weekends with the following question: "How many hours a day, in your free time, do you usually spend watching TV, videos (including YouTube or similar services), DVDs, and other entertainment on a screen?". The response categories were, "None at all", "About half an hour a day", "About 1 hour a day", "About 2 hours a day", "About 3 hours a day",

"About 4 hours a day", "About 5 hours a day", "About 6 hours a day", and "About 7 or more hours a day". This question has acceptable reliability among young adolescents (Bobakova et al., 2015; Liu et al., 2012). Based on the guidelines for daily screen time limits of 2 hours, the data were dichotomized into meeting the TV screen time with responses of less than two hours, and those who exceeded TV viewing time when the reporting was two hours or more during the week days.

Pooling items

The data from COSI and HBSC were combined for analysis of physical activity and screen time behaviour. MVPA at least 60 minutes per day (WHO, 2010) was considered as a cut-off. COSI variable 1 hour or more per day during weekdays children spend playing actively/vigorously was combined with HBSC data of a group of physically active adolescents who indicated that they had been physically active for at least 60 minutes a day for the last 7 days. Children (COSI) who never or less than 1 hour on a weekday actively play outside school hours (physically inactive) were combined with adolescents (HBSC), who indicated that they are physically active 0-6 days.

For the screen time variable, the children in COSI and HBSC studies were grouped into two similar groups: the first group is with children who usually spend less than 2 hours watching TV per a weekday and the second group consisted of children who usually spend 2 and more hours watching TV during a weekday.

Statistical analyses

Frequency analysis of data with elements of descriptive statistics and contingency tables with chi-square test were used to assess differences in gender, age, and rural/urban place of residence categories. All analyses were conducted using SPSS version 22.0 for Windows (SPSS Inc., Chicago, IL, USA).

Results

In Table 2 the proportion of physically active children decreased by age and was associated with urbanization level. Gender difference was statistically significant only for 15-years old adolescents (p<.001) with higher proportion of physically active boys (34.2%) than girls (26.8%). In rural settings the proportion of active children significantly higher among 11- and 15-years old adolescents. In general, the amount of physically active school children from 9 to 11- through 15-years old age groups declined from 68.1% to 34% (p<.001).

Table 2. Proportion of children and adolescents who met physical activity recommendations by age and urbanization level

	Gender					Total		Place of residence				
	Boys		Girls					Rural		Urban		
	N	%	N	%	P	N	%	N	%	N	%	P
9-y olds *	1251	69	1212	67.2	0.33	2463	68.1	476	65.8	1201	69.0	0.12
Adolescents **	741	36.4	627	31.6	0.001	1368	34.0	674	37.2	695	31.5	<.001
11-y old	262	36.7	231	33.0	0.15	493	34.9	249	38.4	244	31.9	0.01
13-y old	263	38.2	220	35.0	0.24	483	36.7	225	37.9	259	35.8	0.43
15-y old	216	34.2	176	26.8	0.004	392	30.5	200	35.1	192	26.7	0.001

* Playing actively/vigorously for 1 or more hour/day. ** Daily MVPA of at least one hour

As children and adolescents got older, fewer spent less than 2 hours of TV viewing per day during weekdays (p<.001). Statistically significant gender difference was revealed for 11- and 13-years old adolescents with higher proportion of girls who met recommended daily screen time cut-off (Table 3). Higher percentage of rural 9 years old children and 11 years old young adolescents spend less than 2 hours daily watching TV. Further analyses by age were conducted. As children age from 9 to adolescence, the prevalence of meeting screen time guidelines dropped significantly from 75.4%: to 60.3% at 11 year olds ($p<0.001$, $\chi2 = 14.5$, df = 1.0); to 53.2% at 13 year olds ($p<0.001$, $\chi2 = 60.2$, df = 1.0); to 47.3% at 15 year olds ($p<0.001$, $\chi2 = 121.6$, df = 1.0).

Table 3. Proportion of children and adolescents who met the screen time recommendations of less than 2 hours per day

	Gender					Total		Place of residence				
	Boys		Girls					Rural		Urban		
	N	%	N	%	P	N	%	N	%	N	%	P
9-y old	875	72.9	915	78.0	0.19	1790	75.4	507	74.2	1069	63.2	<.001
Adolescents	1001	52.3	1064	55.4	0.055	2065	53.8	974	56.5	1092	51.7	0.003
11-y old	386	57.3	426	63.3	0.02	812	60.3	389	63.8	423	57.4	0.02
13-y old	331	50.5	347	56.1	0.04	678	53.2	319	55.8	360	51.2	0.11
15-y old	284	48.5	291	46.1	0.40	575	47.3	266	49.1	309	45.8	0.26

Discussion

In this study we investigated the changes in physical activity and television viewing among national representative sample of children and young adolescents in Kazakhstan. To our knowledge, this is the first time that data has been used to report the levels of physical activity and TV viewing time of children and adolescents in Kazakhstan through national representative samples using data that is comparable with other international studies. The adoption of COSI and HBSC in Kazakhstan has played a pivotal role in the production of this study.

There was a large decline in physical activity and increase in TV viewing from children to adolescents and males were more active and sedentary than females. Unfortunately, this is a familiar finding across the globe (Aubert et al., 2018; Chen et al., 2018). Policy makers, practitioners and researchers have suggested various reasons for these declines, including more structured learning in schools as the children transition to secondary level education (De Meester, Van Dyck, De Bourdeaudhuij, Deforche, & Cardon, 2014), more social interaction through hobbies than prescribed activities organised by parents (Sebire et al., 2018) and sport activities become more competitive amongst others (Kokko, 2014). Yet, these trends have also been reported in younger age groups, for example in five European countries, there was a significant decline in physical activity and increase in sedentary behaviour between 6- and 11-years old (Schwarzfischer et al., 2019). Under the "Densaulyk" programme in Kazakhstan, there has been an increase in sport facilities yet in some rural areas, every fifth school does not have indoor facilities for physical education (Nurlanov et al., 2018). Therefore, the current infrastructure still requires improvements in order for individual behaviour change mechanisms can work effectively (Rutter, Cavill, Bauman, & Bull, 2019).

The data from this study supports the notion that the physical environment plays a role into the physical activity and sedentary behaviours of children and adolescents (Schmid, Pratt, & Witmer, 2006) because physical activity was higher for rural adolescents (particularly 11y- and 15y- olds) and screen time behavior was less prevalent among 9- and 11-years old from rural settings. Contrary to our results, Tabak, Oblacińska, and Jodkowska (2012) reported no differences between urban and rural areas for physical activity among Polish adolescents, whereas in rural areas of Brazil, higher levels of physical activity were reported (Regis et al., 2016). Kazakhstan is one of the most sparsely populated countries in the world and there is a stronger contrast between rural and urban when compared to more densely populated countries. This may be a reason for these results. More researches are needed to understand the cultural context and the environment.

Strengths and Limitations of the study

This study consists of data from two data sets that are frequently used for national reporting. There are limitations in that for the younger children there were proxy reporting by adults and their perceptions of their children's behaviour, whereas for the adolescents, they completed the survey themselves. In both cases there is likely to be reporting bias, thus limiting the interpretation of the results. However, the extent on it is throughout the study and provides a cost-effective strategy for collecting surveillance data (Biddle et al., 2011).

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