

Nazarbayev University School of Medicine

Master of Public Health Program

Bullying among adolescents in Astana, Kazakhstan:

Prevalence and Associated Factors

(cross-sectional study)

Professional Publication Framework

by

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Astana, Kazakhstan

2018

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Acknowledgements

I would like to express my deepest gratitude to my advisor Raushan Alibekova for her contribution in this master thesis, valuable instructions, and continuous support.

I am sincerely thankful to our MPH program founder Byron Crape for his passionate desire to give us useful knowledge and huge contribution in us as public health professionals.

I am thankful to the whole MPH Program Faculty of Nazarbayev University for their inspiration, supportive environment and assistance.

I would like to acknowledge Astana department of the National Centre for Problems of Healthy Lifestyle Development for sharing with their database, providing valuable information and for their continuous interest in the project.

I am very grateful to my family and friends for their kind attitude, patience and continuous support.

Abstract

Background: Bullying is one of the main negative phenomenon in children's mental health development. Studies worldwide showed the association of bullying with different factors, such as gender, race, family and peer relationships, perceptions related to life, health etc. The situation of bullying is not yet explored in Kazakhstan due to absence of proper monitoring tools. The aim of this study was to (1) assess the prevalence of the bullying among school children aged 11-15 years old, and (2) examine patterns of the association between bullying and socio-demographic, mental and physical health characteristics among schoolchildren of Astana city, Kazakhstan.

Methods: The part of the dataset from a cross-sectional study of Health Behaviour of School Children (HBSC) related to Astana city was used in the analysis. The data included information about school children of the 5th, 7th and 9th grades (aged 11-,13-,15-years) in schools of Astana city. Bivariate and multivariate logistic regression was used for analysis.

Results: This pilot study has revealed high prevalence of involvement in general bullying (53%), perpetration (37%), and victimization (44%). Boys were more often involved in bullying, compared to girls ($p=0.058$). Victimization had strong association with frequent headaches (OR 4.52, 95% CI 1.47~13.95) and use of social media (OR 1.92, 95% CI 1.26~2.94). Perpetration was more frequent among children who experience stress with doing homework (OR 10.08, 95% CI 1.82~55.85), play computer games more than three hours on weekends (OR 7.27, 95% CI 1.27~14.38) and smoke electronic cigarettes (OR 6.04, 95% CI 1.56~2.42).

Conclusion: Bullying is a significant mental health issue among school children of Astana, with high rates of prevalence and a number of associated factors. Study findings can be useful for early detection and prevention of bullying among schoolchildren.

Introduction

The health of the growing population is essential for positive and active development of the society. It is important to control and develop the children's environment for their steady healthy development not only physically, but mentally too. Moreover, children's mental health impacts their adulthood behaviour. World Health Organization (WHO) stresses the period of mental and physical formation at school period and creates modern reforms directed to this period (WHO, 2017).

According to work of Olweus (2010), bullying can be called as one of the main negative phenomenon in children mental health development. Bacchini (2015) defines bullying as “a specific type of aggression manifestation characterized by intentional, repetitive abuses against another person through making harm or disturbing the victim due to difference of power”.

Background

Bullying is a widespread socio-psychological phenomenon, especially, among children and adolescents who are highly susceptible to bullying behaviour due to their physical and mental immaturity. Carney and Merrell (2001) claimed the highest rates of bullying related to 9-15 years age group. According to numerous surveys, the estimated rates of traditional and cyber- bullying among school children are in a range of 9-49% (Carlyle & Steinman, 2007; Greenleaf et al., 2014; Griffiths, Wolke, Page, & Horwood, 2006; Ringwalt & Shamblen, 2012; Wang, Iannotti, & Nansel, 2009; Wang et al., 2010). There are two roles of involvement in bullying process, where perpetrator is the one, who bullies another person, and victim – the target of the bullying. There is also a group of researchers, which identified children, who experienced both roles. Nansel et al. (2004) published results of bullying prevalence among adolescents aged 11-16 years across 25 countries, where 10% of children

were recognized as perpetrators, 11% admitted as being victims, and 6% reported to be bully-victims during the current school term.

Bullying is dangerous with its negative consequences on child's world perception development and serious enduring complications further in adulthood behaviour, which have been widely demonstrated. In fact, many cross-sectional and longitudinal studies showed negative sequelae of school bullying on psychiatric, psychosomatic, and physical health (Due, 2005, Rigby, 1999; Nansel, 2003; Arseneault, 2006; Craig, 1998; Kumpulainen, 2000; Kim, 2006; Gini, 2009; Sourander, 2007; Sourander, 2008; Klomek et al., 2009). Rigby (2003), in his qualitative review, classified all consequences of bullying into four groups, which are low psychological well-being, poor social adjustment, psychological distress and physical illness. The involvement in bullying lead to such psychiatric disorders as truancy, low prosocial behaviour, delinquency, substance abuse among bullies (Smith et al., 1999; Coie JD, Dodge KA., 1998; Kumpulainen et al., 2001) and low self-esteem and self-worth, fear, anxiety, depression, and suicidal thoughts among the victims (Hodges et al., 1999, Neary A, Joseph S., 1994; Cleary SD., 2000; Kim et al., 2005; Carlyle & Steinman, 2007; Greenleaf et al., 2014).

Victimization was shown to be a potential indirect catalysator of suicidal behaviour. Several studies showed that children who are frequently involved in bullying are two times more susceptible to depressive symptoms compared to uninvolved ones (Saluja et al., 2004). But it is mostly related to the severe forms of bullying, such as sexual abuse and severe beatings followed by running away from home (Meltzer et al., 2011). Meltzer et al. (2011) reported that adults who experienced bullying in childhood are more than twice as likely to attempt suicide later in life, comparing to uninvolved population.

Related factors

Bullying has become an actual topic of empirical studies in the last decades of previous century (Griffin Smith R, Gross AM., 2006). Nowadays this issue is still actively being developed, and studies showed the association of bullying with a range of potential external and internal risk factors.

Gender

Bullying has specifics related to gender. According to the study done by Griffiths LJ et al. (2006), boys are more likely to be bullied, compared to girls. On the other hand, it also depends on the type of the bullying. For instance, males are more involved in traditional bullying, while indirect types of bullying, such as gossiping and sabotage, are extensively spread among females (Catanzaro, 2011; Hinduja & Patchin, 2008; Kupferman-Meik et al., 2013; Peguero, 2012; Seals & Young, 2003; Wang et al., 2010).

Other socio-demographic factors also affect the bullying status. According to meta-analysis, 28 studies have demonstrated the association of bullying and socioeconomic status (SES). But at the same time, some studies showed that this association may change according to the roles of participation in bullying (Tippett & Wolke, 2014).

Overweight/obesity

Overweight and obesity among children are emerging issues in the last decades. Many studies have shown that overweight/obesity is associated with a myriad of negative social and psychological consequences which includes impaired psychological well-being, weak peer relations, such as peer rejection and aggression, and bullying (Griffiths et al., 2006; Pearce MJ, 2002; Kraig KA, Keel PK., 2001). In fact, many studies showed that overweight and obesity were concluded to be the most common accelerator of bullying among school

children compared to religion, race or disability (Dario Bacchini, 2015; Carina S, 2012 Eisenberg et al., 2015; Garnett et al., 2014; Janssen et al., 2004; Mamun et al., 2013). Studies also showed that overweight/ obesity can be both as a risk factor and consequence of bullying process (Olweus, 2010; Mamun et al., 2013).

At the same time, weight can be a reason for both perpetration and victimization (Gray et al., 2009; Kupferman-Meik et al., 2013). However, being a victim is more associated with overweight and obesity. Victimization leads to development of children's lifestyle, and causes obesogenic behaviours by avoiding social activities, binge eating as response to distress (Gray W, 2009). The findings suggest that adolescents of both genders who were ever bullied by their peer at the age of fourteen have greater risk of higher BMI and obesity by young adulthood (Mamun et al., 2013).

Body image

The association of bullying with body image was also studied (Zequinão et al., 2017). The study showed that body satisfaction is related to body weight, role of participation in bullying, age and gender. Boys involved in bullying have greater odds of body dissatisfaction due to thinness.

Family factors

Numerous studies identified the association of family influence with bullying process (Eron, Huesmann, & Zelli 1991; Garnefski, & Okma, 1996). They claimed that family factors can play either protective or risk factor role. Several researches, studying parental practices such as parental warmth and support, and number of friends, showed that relationship with parents and friends can be protective factors against bullying and victimization (Jing Wang, 2009).

Loeber and Hay (1997) found that some family factors, such as poor parental supervision and monitoring, harsh parental discipline, inconsistency between parents, parental disharmony, parental rejection and low parental involvement with the child predicts the adolescents' problems. Other studies showed that parental education plays an important role in child's personal and social development (Rigby,1994, 2007; Smith, & Myron-Wilson, 1998). Olweus(1978) also found the positive association between a boy's aggression and his mothers loyalty for such behavior. Also, Berdondini & Smith (1996) concluded that perpetrators are more likely to be grown up without a father in a family.

Addiction to social media

Griffiths (2014) reported on the social media addiction as one of the raising concerns with the potential risk of bullying.

Risky behaviour

Both perpetrators and victims have problems with perceiving the difficulties (Sourander et al., 2010). Problems with dealing with difficulties are also reflected on their risky behaviour. Sourander A. et al found the association of cyberbullying with frequent smoking and drunkenness (Sourander et al., 2010).

Bullying in Kazakhstan

There is a lack of published data about mental and physical health of school-children, especially related to adolescents, in Kazakhstan. Despite bullying being a focus of numerous researches worldwide, it is not well studied yet in Kazakhstan. No appropriate methods of studying and monitoring school-children's health in Kazakhstan were found, as well as any statistics related to this issue. However, according to the statistics of the WHO, Kazakhstan ranks second among suicide rates worldwide, with a sharp increase of the suicide rates among 15-24 years olds (WHO, 2008). UNICEF statistics also showed high suicide rates equal to

9.1 and 20.5 per 100,000 for girls and boys aged 15-19 years, respectively, in 2014 (UNICEF, 2015). Hence, it can be stated that there is real danger concerning mental health of adolescents.

Study aims

The aims of our study were to (1) assess the prevalence of the bullying among school children aged 11-15 in Astana, Kazakhstan, and (2) to explore the association of bullying with overweight/obesity, socio-demographic characteristics, social communication, environmental, and risky behavioural factors, and physical and mental health characteristics of children. The results of the study will contribute to extending the knowledge on bullying and improving the school-children's health in Kazakhstan.

Methods and Materials

As a source of information, secondary data of Health Behaviour in School-Aged Children (HBSC) survey was used. The data was provided by local department of the National Centre for Problems of Healthy Lifestyle Development of the Ministry of Healthcare of the Republic of Kazakhstan in Astana. HBSC survey was conducted in Kazakhstan for the first time in 2017. Thus, it's a great opportunity to learn about school-children's health, well-being, lifestyle and social environment.

Health Behaviour of School-Aged Children

The Health Behaviour of School-Aged Children (HBSC) survey is an international survey related to school-aged children's health and health behaviours, which takes place every four years. HBSC is a complex research with well-developed methodology, systematic data analysis and wide distribution of the findings. The content of the survey touches different aspects of children development and surrounding environment. Thereby, it can be applied in many fields such as psychology, sociology, epidemiology, public health, etc. The

aim of the survey is to gain new insight information and increase understanding of health behaviours, health, well-being, lifestyles and social contexts of young people in different countries (Hbsc.org, 2014).

HBSC organization is a primary partner of WHO in children health issues that makes huge contribution in raising awareness in understanding of main issues, specifics and tendencies of adolescents' health for developing and improving their programmes and policies in the WHO Child and Adolescent Health Strategy (Hbsc.org, 2014). Now, HBSC survey is being conducted in 47 countries and regions, including Europe, North America and Kazakhstan. Also, the organization still developing their potentials and has partnerships with other agencies in their field of work such as UNICEF and OECD.

Questionnaire

Dataset is based on HBSC self-administered questionnaire. The survey consists of question sets, related to the most actual health topics such as mental health, family and peer's relationships, school environment, health, life satisfaction, diet and physical activity, body image, bullying and fighting, tobacco and alcohol use, sexual behaviour etc. The survey also concentrates on social environment of young population that includes family and friends, living conditions and also school environment. As an international standardized questionnaire, HBSC survey allows to make analysis on national and cross-national levels. This is achieved by specific structure of the questionnaire. HBSC questionnaire consists of three groups of questions: core questions, which are essential for every survey content and are the basis for cross-national comparison; optional packages (sets) of questions, focused on specific types of research field, that country can select for any research purposes and may vary in different countries; and the last group is country-specific questions, exploring the current health issues on the national level (Currie C., et al., 2010).

Sample

Due to the cluster sampling, where primary sampling unit was the class, and the number of schools, calculated according the number of children in one class, recruitment was done from six randomly selected mixed state schools from different districts of Astana city, during the school year from September to December 2017. In Astana city the needed sample size was equal to 500 children, according to Epi Info calculation (80% of power, OR= 3, and 95%CI). However, for a pilot study, only 100 questionnaires were used. So, the dataset includes the information of 100 participants, randomly selected from 500 participants of Astana city.

The data set includes the information about school children of both gender and of the age 11, 13 and 15 years old. These age groups were chosen as representative ages of the onset of adolescence period, the time of physical and emotional formation and as the periods, when important life and career decisions are made. School children from state schools in 5th, 7th and 9th grades studying in Kazakh or Russian languages participated. The data was collected in two national languages. As a part of the international survey, the data was translated in English for further transparency and analysis.

Variables

Outcome variable was measured as general involvement in bullying process, which included perpetrators (who bully others) and victims (who was bullied). Additional analysis was also performed with perpetrator and victim status as dependent variables. Two questions were used to measure bullying: “How often did you participate in bullying someone at school?”, and “How often have you been bullied at school?”. The answers measured the frequency of the outcome by the number of days. Only “no/never” answer wasn’t counted as bullying participation.

Independent variables were the variables presenting the measures of related factors.

Socio-demographic factors included gender, grade (5th, 7th and 9th), language of study (Kazakh or Russian), and socio-economic status (SES). For measuring socioeconomic status, the Family Affluence Scale (FAS) scale was used. FAS scale was developed by the HBSC group of researchers, due to the absence of appropriate scale. Traditionally, the socioeconomic status of children was measured only by parental occupation and education, which lead to low response rates and missing of the needed data (Currie et al. 2008). HBSC group of scientists helped to overcome such gaps in data collection through measurements of material affluence, which was a proxy for socioeconomic status. Current FAS measures include the collection of parental occupation and educational status, material resources, their patterns of consumption and purchasing power (Hartley et al., 2016). For the current study, the SES variable was a composite dichotomous variable with two categories: low and high. The cut-off point was identified as a mean of the variable (Currie c., 2010).

Weight related factors consist of Body Mass Index (BMI) and body image.

Body weight was measured by body mass index (BMI) that was calculated with the formula weight in kg divided by height in m² (kg/m²). The International Obesity Task Force (IOTS) cut-points were used as the thresholds of BMI for overweight and obesity. The cut-off points of overweight were BMI equal 21 for 11-year old children, 22 and 23 for 13- and 15-years old children, respectively (Currie C., 2010). In the analysis, the rates of overweight and obesity were combined in one group, due to low cases of obesity.

Body image variable measured the attitudes of children on their self-perception by asking about how they perceive their body. Answer options were “much too thin”, “thin”, “normal”, “fat”, “much too fat”.

Physical activity was measured by moderate-to-vigorous physical activity (MVPA) and vigorous physical activity (VPA) measures. The MVPA measurement assessed the number of days over the past week during which they were physically active for a total of at

least 60 minutes. The question was presented as any activity that increases the heart rate and makes the person get out of breath, with examples provided. The recommended amount was three days of activity per week. According to VPA, children were asked about the number of hours per week that they were usually physically active in their free time (outside school hours), so that they got out of breath or sweated. The response options were combined into dichotomous variable, where the low physical activity was presented as less than 3 hours per week, and high physical activity was presented as three or more hours per week.

Variables related to sedentary behaviour were measured by the time spent on playing games on computer, watching television, videos (including YouTube or similar services), DVDs and other screen entertainments in weekdays and weekends. Three or more hours of computer game playing on weekdays or weekends were considered to be as abnormal.

Risky behaviour factors were presented by smoking and alcohol consumption.

The smoking status was defined based on the question 'How often do you smoke tobacco at present?'. The possible responses options included 'every day', 'at least once a week, but not every day', 'less than once a week', or 'never'. Adolescents, who smoked 'less than once a week' or more often, were considered to be cigarette smokers (Pärna, 2008). For smoking electronic cigarettes, the same type of question was used. These two types of smoking were measured separately to define the seriousness of the electronic cigarettes issue.

Alcohol consumption was measured by the general question "How often do you drink alcoholic beverages at present?". The response options included: 'never', '1-2 days', '3-5 days', '6-9 days', '10-19 days', '20-29 days', '30 and more days' during the lifetime. All responses except for "never" were counted as positive.

In assessing the mental health of the children, variables of depression and frequency of headaches were used. These two variables measured by the frequency of depressive mood

and headaches during the last six months. The answers “once a month” or more frequent were counted as bad health conditions, such as having depression and frequent headaches.

Due to low prosocial behaviour cases among children involved in bullying, communication measurements were included in the analysis. Measurement of social relationships consisted of online communication, attitudes to expressing feelings through internet, and social media addiction. Online communication includes four questions related to the frequency of online communication with close friends, general friends group, friends met through the internet and family members. Attitude to internet is measured by three questions related to expressing the feeling, thoughts and secrets through internet. And the last one was affection to social media, which included social networks as Facebook, Instagram, and messengers like WhatsApp, Snapchat, Viber. Social media addiction variable consisted of nine yes/no questions related to importance of the social media compared to other components of daily life. All these three variables were scaled with the mean as the cut point.

Environmental factors included school, social and family environment measurements.

Satisfaction with school environment was measured by asking about the attitudes to school and level of pressure related to difficulties of homework completion, relationship with teachers and atmosphere in the classroom. Homework problems were measured by the question “Do you have problems in doing homework?”. Response options included ‘no’, ‘insufficient’, ‘some problems’. Relationships with teachers were measured by four questions related to the trust, care and attitudes of teacher toward the child and were transformed into unified scale. The atmosphere in the classroom was measured by questions about relationship with classmates. Relationships with classmates were measured by four questions related to the trust, care and attitudes of classmates toward the child and which were transformed to a separate scale.

As a measurement of social environment, the relationship with friends was added to the analysis. The variable was a complex of 3 questions related to the communication frequency and level of trust. The mean was used as a cut point in a scale.

Family measurements included parenthood and family relationship variables. Parenthood variable assess the family composition (full family or single parenthood). The family relationship measurement consists of four questions, describing the level of support and trust in the family. The scale uses a mean as a cut-off point.

Statistical analysis

The data was obtained as an excel file, which was subsequently transferred to Stata software 9, where cleaning of the data by exclusion the questions that are no related to related variables, data coding (creating codebook) and statistical analysis was done. Overall data from 100 participants was used for the analysis.

The dependent variables were involvement in bullying, victimization and perpetration. Independent variables were variables of related factors: socio-demographic characteristics (gender, grade, language of study, family income), risk behaviour factors (tobacco and alcohol consumption), weight related factors (BMI, body image), physical activity and sedentary lifestyle (VPA, MVPA, computer/games console), family factors (parenthood, relationship with parents), school environment (homework problems, relationship with teachers, relationship with classmates), and social environment (relationship with friends).

Univariate and bivariate analysis were conducted to find the prevalence and characteristics of the children involved in general bullying. Further bivariate logistic regression analysis was performed separately for perpetrators and victims for more precise

examination of the strength of associations with related factors by certain role of participation in bullying.

Multivariate logistic regression analysis was conducted in order to control for the effect of confounding variables. The results of the multivariate logistic regression analysis were presented as odds ratios (OR) and 95% confidence intervals (CI). The p-value <0.05 was used as cut-off for significance level.

Ethical consideration

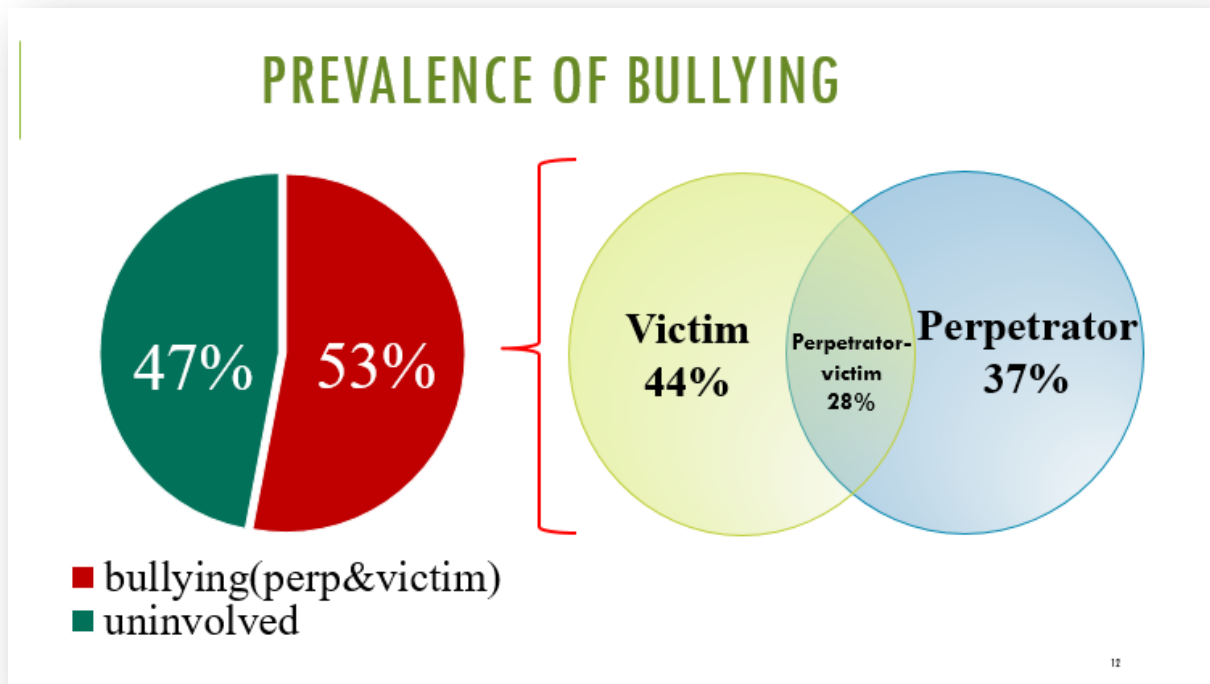
Due to the secondary data, the researcher did not have any participation in data collection. The permission for analysis of the data was provided by Astana city branch of the National Centre for Problems of Healthy Lifestyle Development of the Ministry of Healthcare of the Republic of Kazakhstan. The survey itself was anonymous, so that all personal information of the participants was not revealed. The potential risks were minimal. The study has an exempt approval from NUSOM REC.

Results

General Bullying

A total sample of 100 children and adolescents aged 11, 13, 15 years were included in the study (47 boys and 53 girls with equal percentage rate). Study results showed that the prevalence of the general bullying was equal to 53%, perpetration and victimization were 37% and 44%, respectively. The percentage of children, who participated in bullying as both perpetrator and victim, was equal to 28% (Figure 1).

Figure 1. Prevalence of bullying



The distribution of schoolchildren's sociodemographic, health and behaviour characteristics by involvement in bullying has revealed some statistically significant differences (Table 1). Looking at the characteristics of bullying group, the percentage of bullying by gender, the percent of boys was significantly higher in bullying group as compared with the corresponding percentage in uninvolved group and was equal to 56.6% and 36%, respectively ($p=0.041$). There was statistically significant difference between the groups by smoking status. The results showed that children, who have ever tried to smoke faced with the bullying more often, comparing with non-smoking children ($p=0.025$). Moreover, the percentage of bullying was also significantly higher in children who smoked electronic cigarettes, compared to non-smokers ($p=0.039$). The significantly higher prevalence of bullying involvement was found among children with self-reported depression, compared to those without depression ($p=0.043$). Bad relationships with classmates was higher in bullying group, compared to uninvolved group (26.92% vs 8.51%, respectively;

p=0.018). The higher addiction to social media were noted among children involved in bullying (p=0.005).

Table 1. Characteristics of children involved in bullying in Astana, 2017 (n=100)

Variable	Bullying (%)	Uninvolved (%)	p-value
Gender			0.041*
Male	56.6	36.17	
Female	43.4	63.83	
Grade			0.313
5 th	37.74	42.55	
7 th	41.51	27.66	
9 th	20.75	29.79	
Language			0.870
Kazakh	28.30	29.79	
Russian	71.70	70.21	
BMI			0.213
Normal	95.56	88.37	
Overweight/obese	4.44	11.63	
Body image			0.120
Very skin	9.4	2.1	
Skin	22	12.77	
Normal	47	70.2	
Overweight	13.2	12.77	
Obese	7.6	2.13	
Smoking			0.026*
Yes	10	0	
No	90	100	
Smoking of electronic cigarettes			0.039*
No	79.25	93.62	
Yes	20.75	6.38	
SES			0.889
Low	73.38	72.34	
High	26.42	27.66	
Depression			0.043*
No	65.91	84.44	
Yes	34.09	15.56	
Relationships with classmates			0.018*
Good	73.08	91.49	
Bad	26.92	8.51	
Addiction to social media			0.005*
No	48.53	51.47	
Yes	64.29	35.71	

*Statistically significant at p<0.05

There were also some interesting trends in differences of bullying prevalence by other characteristics, but they were not statistically significant (Table 1). For instance, children of the 7th grade were more often involved in bullying, compared to their younger and older counterparts; and involvement in bullying among students with Russian language of studies was dramatically higher compared to Kazakh language classes with the prevalence of 71.70% and 28.30%, respectively. Furthermore, the prevalence of bullying among overweight/obese children was 4.44%, which is lower compared to the prevalence among children with normal weight (95.56%). Comparison of schoolchildren by bullying status and body image showed that children with self-image as “very skin”, “skin” and “obese” were more often involved in bullying, compared to the kids with self-perceived normal weight.

The distribution of other sociodemographic, health and behaviour characteristics of schoolchildren by general involvement in bullying process did not show statistically significant differences and are presented in the *supplementary Table B* in the Appendix.

Victims and Perpetrators

Table 2 presents the results of the bivariate logistic regression analysis by Victimization status. Study findings showed that children of 7th grade 2.5 times more often reported as being victims of bullying ($p=0.054$). Also, victims had 4.3 times higher odds of being involved in leisure time physical activity, compared to all other children. Depression had significant relation with victimization. Victims had 2.43 times higher odds of having depression. Victims were also characterized by 1.12 times higher odds of having problems with health condition such as headache ($p=0.037$). Analysis of an attachment to active participation in social media showed strong association with victimization. Namely, those children who had social media addiction had 2 times higher odds of being a victim ($p=0.001$).

Moreover, children who reported bad relationships with classmates had 4 times higher odds of being a victim of bullying ($p=0.010$).

Table 2. Bivariate analysis of victims with related factors

Variable	Victims	p-value
Grade		
5 th	Ref	
7 th	2.5	0.054
9 th	0.78	0.652
Free time physical activity		
< 3 hours per week	Ref	
≥3 hours per week	4.3	0.030
Depression		
No	Ref	
Yes	2.43	0.077
Headache in last 6 months		
Rare	Ref	
Often	1.122	0.037
Relation with classmates		
Good	Ref	
Bad	4.42	0.010
Social media addiction		
No	Ref	
Yes	2.11	0.001

Bivariate logistic regression analysis by Perpetration status (Table 3) showed that boys were 2,23 times more involved in perpetration, compared to girls ($p=0.058$). There was also found a significant association between perpetration and smoking. Smokers had 8 times higher odds of being a bully. Furthermore, smoking of electronic cigarettes was characterized by 5.46 times increased odds of becoming a perpetrator ($p=0.008$). Children with poor self-assessed health status, frequent computer game playing, having difficulties in doing homework and bad relations with teachers, were more often involved in bullying, compared to other children ($p<0.05$). Similar to victimization, poor relationships with classmates was associated with higher risk of involvement in bullying, though to a lesser extent (OR 1.46, $p=0.041$).

Table 3. Bivariate analysis of perpetrators with related factors.

Variable	Perpetrators	p-value
Gender		
Female	ref	
Male	2.23	0.058
Smoking		
No	Ref	
Yes	8.27	0.064
Smoking electronic cigarettes		
No	Ref	
Yes	5.46	0.008
Self-health assessment		
Good	Ref	
Bad	1.75	0.041
Relationships with classmates		
Good	Ref	
Bad	1.46	0.041
Relation with teachers		
Good	Ref	
Bad	3.75	0.024
Homework issues		
No	Ref	
Insufficient	2.5	0.068
Some problems	8.67	0.008
Computer game playing on weekends		
< 3 hours per day	Ref	
≥3 hours per day	3.4	0.019

Multivariate analysis

In the final multivariate logistic regression model with the outcome of victimization (Table 4), there was found the independent association of being a victim with social media addiction and headache frequency measurements. The results showed that the prevalence of victims was almost two times higher among children with social media addiction (OR 1.92, 95% CI 1.26~2.94) and among children who had frequent headaches (OR 4.52, 95% CI 1.47~13.95).

Table 4. Multivariate logistic regression of victims

Variables	Odds Ratio	p-value	95%CI
Social media addiction			
No	Ref		
Yes	1.92	0.002	1.26;2.94
Headache in last 6 months			
Seldom	Ref		
Rare	4.52	0.009	1.47;13.95

In the final multivariate model, perpetrators were found to have strong association with homework problems, active computer game playing on weekends and smoking electronic cigarettes. The odds of becoming a perpetrator were 10 times higher in children who have experienced stress with doing homework, 4 times higher in children playing computer games more than three hours on weekends, and 6 times higher in children who experienced smoking electronic cigarettes (Table 6).

Table 5. Multivariate logistic regression of perpetrators.

Variable	Odds Ratio	P-value	95%CI
Homework problems			
No	Ref		
Insufficient	2.55	0.109	0.81;7.99
Some problems	10.08	0.008	1.82;55.85
Computer game playing on weekends			
Ref			
< 3 hours per day	4.27	0.019	1.27;14.38
≥3 hours per day			
Smoking of electronic cigarettes			
No	Ref		
Yes	6.04	0.009	1.56;2.42

Discussion

This study showed the high prevalence of involvement in bullying among school children in Astana city. General involvement in bullying was equal to 53%. Major previous studies in this field showed the prevalence of bullying about 20- 30% among school children in European countries (Gini G., & Pozzoli, T., 2009). In the Russian Federation, the rate of bullying was equal to 18% (WHO Regional Office for Europe, 2016). Such high rates could be related to the fact that bullying is considered to be a part of socialization, growing and formation processes. Almost all children are exposed to the bullying process to some extent. However, all negative consequences are mostly related to harsh bullying cases (O'Moore, 1990).

The current study also showed higher prevalence of victimization (44%), compared to previous Western studies, which reported the rate of being victimized about 5% - 20%, with an average of 11% across countries (Nansel, 2004). However, another study of Korean students have reported the prevalence rate of victimization equal to 63.4%(Kwon SJ, 2012). Prevalence of perpetrators in our study was 37%, which is also higher in a comparison with previous studies (Nansel, 2004). Such divergence in current findings might be related to variations across countries in definitions of victimization, methods, instruments, sample size and school systems.

We also found a significant difference in the prevalence of bullying involvement by gender. Boys were two times more often involved in perpetration, compared to girls. Previous studies also found that boys more frequently bullied (Pengpid, 2013; Karlsson, 2014). On the other hand, some other studies showed that association with gender is different depending on type of bullying. For instance, the physical bullying is more typical for boys, while indirect types of bullying (as nickname giving, rumours and sabotage) are more related to girls

(Catanzaro, 2011; Hinduja & Patchin, 2008; Kupferman-Meik et al., 2013; Peguero, 2012; Seals & Young, 2003; Wang et al., 2010)

The results of the multivariate analysis showed that victimized children experienced headaches more frequently, compared to all other peers. These results are consistent with previous studies. Meta-analysis on this topic reported that victims has higher risk of psychosomatic problems such as sleeping problems, bad appetite, headache, backache (Gini, 2009). Our study results also showed a strong association of victimization with social media addiction. Such association was explored in other studies as well (Cheng et al., 2015). However, there was mentioned only one type of the bullying process- cyberbullying, that could be associated with social media addiction. The mechanism and causality of relationship between victimization and social media were not fully explored.

Similar to the study conducted by Jankauskiene et al. (2008), current study has found that perpetration was associated with higher involvement in smoking. Electronic cigarettes smoking also showed positive association with perpetration, which is an important finding for raising the concern about this new type of smoking among growing population. Previous study showed at least 2 times increase of smoking among bullying perpetrators (Vieno, 2011). Our study findings showed that tobacco smoking was associated with 8-times higher risk of being perpetrator according to the bivariate logistic regression analysis; and that electronic tobacco smoking was independently associated with 6 times higher risk of perpetration after adjusting for confounding variables in the multivariate model.

Consistent with previous studies, our results also showed strong association of perpetration with higher stress level during doing homework. Shetgiri et al. (2012) has reported that perpetrators were less likely to ‘always’ or ‘usually’ complete all their homework, which is one of the signs of having emotional, developmental, or behavioral

problems. Our study results also showed strong relationship of perpetration with computer game playing. It can be explained by the fact that most computer games nowadays have aggressive content, and thus may lead to bullying behavior. However, no published data regarding this kind of relationship was found, and further exploration of the found association is needed.

Despite that our study was able to reveal significant associations of bullying with a number of schoolchildren's socio-demographic, health and school environmental characteristics, obesity and overweight did not show any statistically significant relationships with bullying. Most previous studies have also demonstrated significant association of bullying with some other factors, related to social and family environment; however, in our study we were not able to reveal those associations.

Although overweight and obesity are considered as one of the main risk factors of bullying, our study did not reveal any significant associations neither with victimization nor with perpetration. These results could be due to the low prevalence of the overweight/obesity among our study participants. According to WHO report the first-ever COSI Study on the topic of overweight and obesity in Kazakhstan, the total percentage of overweight, including obesity among young population is equal to 19,1% in 2015-2016 (World Health Organization, 2018). While, in this study with small sample size of 100 schoolchildren, the prevalence of combined variable of overweight and obesity was only 8 %.

Despite the fact, that many studies highlighted the influence of family environment on the bullying behaviour, this pilot study did not reveal any relationship. Veenstra et al. (2005) in their study also examined parenting factors and assumed that measures of parenting such as emotional warmth, rejection and overprotection are not associated with behaviours leading to victimization, pretending that the environmental factors strengthen the internalizing and

externalizing behaviours that increase children's risks of bullying. At the same time, Bowes (2009) states that physical maltreatment has significant association on later bullying, adjusting to measurements of children's internalizing and externalizing problems. Hereby, the child's family or school environmental factors can increase the likelihood of being bullied.

The current study assessed the prevalence of bullying and its associated factors among adolescents in Astana city. The important strength of the study is that it opens the veil on the subject of bullying among teenagers in Kazakhstan for the first time. It indicates the prevalence and potential related factors and consequences typical for the region. Moreover, the study gives ideas for further research in this field.

Despite the strengths, this study also has its limitations. Firstly, the sensitive topic of bullying may lead to unwillingness to respond about such traumatic experience, raising the possibility of reporting bias (Ladd & Kochenderfer-Ladd, 2002).

Secondly, young participants do not always fully understand the concept of bullying or recognize their involvement in it. Therefore, using questionnaires with young children may consider collecting data from multiple informants, such as parents and teachers for clearer picture of bullying situation.

Another limitation of this study was its small sample size. Nonetheless, statistically significant results were determined. These findings underline the importance of the bullying issue in our country and reveals the most significant patterns.

Conclusion

In a conclusion, this study has revealed high prevalence of bullying involvement as well as victimization and perpetration, which stresses the importance of bullying problem in Kazakhstan. The current study found significant association of victims with frequent

headaches and social media addiction. Perpetrators have strong association with difficulties in doing homework, computer game playing on weekends for more than 3 hours, and smoking electronic cigarettes.

As a recommendation, it is important to develop the knowledge about bullying and monitor this issue in Kazakhstan to prevent the potential consequences. Especially, we need to increase the awareness of bullying among children and teachers by holding special educational lectures and activities.

For further studies, it is important to consider the limitations of the current study. Further studies could be done by enlarging sample size, investigating bullying separately in boys and girls, and conducting qualitative and quantitative studies among teachers and parents.

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Appendix

Supplementary Table A. Distribution of socio-demographic, health and behavioural characteristics of participants (n=100)

Variable	Percentage (%)
Gender	
Male	53
Female	47
Grade	
5	40
7	35
9	25
Language	
Kazakh	29
Russian	71
Bullying	
Yes	53
No	47
Body image	
Very skin	6
Skin	18
Normal	58
Overweight	13
Obese	5
Smoking	
Yes	5
No	92
Smoking of electronic cigarettes	
Yes	14
No	86
BMI	
Normal	81
Overweight/obese	7
Self-health assessment	
Bad	3
Satisfied	10
Good	39
Excellent	48
Alcohol consumption	
Never	95
Once or more	5

Family (parenthood) Full One parent	96 4
Homework load None Insufficient Some challenges	33 57 10
Classmates Good Bad	81 18
Depression No Yes	67 22
Physical activity (free time) Every day 4-6 times 2-3 times Ones in a week Ones in a month Less Never	23 18 29 12 2 8 6
Physical activity during a week (in hours) 0 hour 1 hour 2 hours 3 hours 4 hours 5 hours 6 hours 7 hours	4 10 7 20 15 9 9 24
Relationship with teachers Bad Good	77 15
Relationship with friends Bad Good	28 66
Online communication Weak Active	46 47
Attitude to internet Negative	67

Positive	31
SES	
Low	73
High	27
Headache (in 6 months)	
Never or seldom	62
Almost every week	10
Every month	8
Almost every day	3
More than once a week	9
Social media addiction	
No	68
Yes	14
Computer game playing on weekends	
< 3 hours per day	75
≥3 hours per day	20
Computer game playing on week days	
< 3 hours per day	79
≥3 hours per day	18
Family relationship	
Bad	9
Good	91

Supplementary Table B. Characteristics of schoolchildren involved in bullying (n=100)

Variable	Bullying (%)	Uninvolved(%)	p-value
Self-health assessment			0.167
Bad	5.66	0	
Satisfied	11.32	8.51	
Good	43.4	34.04	
Excellent	39.62	57.45	
Alcohol consumption			0.748
Never	94.34	95.74	
Once or more	5.66	4.26	
Family(parenthood)			0.368
Full	94.34	97.87	
One parent	5.66	2.13	
Homework load			0.488
None	30.19	36.17	
Insufficient	56.60	57.45	
Some challenges	13.21	6.38	
Health complains			0.284
Bad	6.98	2.22	
Good	93.02	97.78	
Physical activity (free time)			0.086
Every day	18.87	28.89	
4-6 times	26.42	8.89	

2-3 times	26.42	33.33	
Ones in a week	16.98	6.67	
Ones in a month	1.89	2.22	
Less	7.55	8.89	
Never	1.89	11.11	
Physical activity during a week (in hours)			0.150
0 hour	5.88	2.13	
1 hour	7.84	12.77	
2 hours	5.88	8.51	
3 hours	23.53	17.02	
4 hours	17.65	12.77	
5 hours	11.76	6.38	
6 hours	13.73	4.26	
7 hours or more	13.73	36.17	
Relationship with teachers			0.187
Bad	21.28	11.11	
Good	78.72	88.89	
Relationship with friends			0.367
Bad	34.04	25.53	
Good	65.96	74.47	
Online communication			0.464
Weak	53.06	45.45	
Active	46.94	54.55	
Attitude to internet			0.622
Negative	20.59	65.96	
Positive	29.41	34.04	
SES			0.889
Low	73.38	72.34	
High	26.42	27.66	
Headache (in 6 months)			0.297
Never or seldom	57.78	76.60	
Almost every week	11.11	10.64	
Every month	13.33	4.26	
Almost every day	4.44	2.13	
More than once a week	13.33	6.38	
Computer game playing on weekends			0.018
< 3 hours per day	69.39	89.13	
≥ 3 hours per day	30.61	10.87	
Computer game playing on week days			0.368
< 3 hours per day	49.32	50.63	
≥ 3 hours per day	51.55	48.45	
Family relationship			0.872
Bad	9.43	8.51	
Good	90.57	91.49	