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# FACTORS ASSOCIATED WITH SUICIDAL BEHAVIOUR IN ADOLESCENTS IN LATVIA

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## ANNOTATION

**Introduction.** Suicides are one of most relevant public health problems in Latvia – standardised suicide mortality rates rank Latvia at the high second place among the European Union countries. An important risk factor for completed suicide is suicidal behavior, including suicidal ideation and suicide attempts, that is a risk factor for completed suicide and is often used in research of associated risk factors and is especially relevant in adolescent populations. Factors related to family environment, peer environment and individual factors have an important role in relation with adolescent's suicidal behavior, in particular taking in consideration the fact that prevalence of several of these potential risk factors in Latvia is estimated as high.

The aim of the Thesis was to assess prevalence of self-reported suicidal behaviour and its association with family and peer environment related factors, as well as individual factors in the population of 14 to 17-year-old adolescents in Latvia.

**Material and methods.** Data from representative cross-sectional study “European School Survey Project on Alcohol and Other Drugs” was used, including the data about 7,299 respondents. The instrument of the study was approved standardised survey questionnaire. Statistical data processing was based on frequency distribution, cross tabulation and Chi-Square ( $\chi^2$ ) Test. To assess the associations odds ratio, Spearman's rank correlation coefficient and multiple logistic regression was used.

**Results.** Suicidal ideation during lifetime have been noted by 15.7 % of Latvian 14–17-year-old adolescents – 11.7 % boys and 19.4 % girls, while suicide attempts during their life time have been noted by 8.2 % of adolescents – 5.9% boys and 10.2% girls. The prevalence of suicidal ideation was higher among adolescents who evaluate their family's material status as low; among

girls also a higher prevalence of suicide attempts was observed among respondents who evaluated material status as low.

Factors related to family environment that independently increase the odds for suicidal ideation in both gender groups are suicidal experience in the family, domestic physical violence, rarely/never and sometimes experienced emotional support from parents, but separately for boys - not living with both biological parents. Factors related to family environment that independently increase the odds for suicide attempt in both gender groups are suicidal experience in the family, domestic physical violence, rarely/never experienced emotional support from parents and not living with both biological parents, but separately for boys – sexual harassment in the family and separately for girls – sometimes experienced emotional support from parents.

Factors related to peer environment that independently increase the odds for suicidal ideation in both gender groups are suicidal experience among peers, always/often and sometimes experienced bullying at school, but separately for girls – rarely/never and sometimes experienced emotional support from peers. Factors related to peer environment that independently increase the odds for suicide attempt in both gender groups are suicidal experience among peers, always/often and sometimes experienced bullying at school, but separately for girls – rarely/never experienced peer emotional support.

Individual factors that independently increase the odds for suicidal ideation in both gender groups are high and moderately high level of depressive symptoms, low and moderately low level of self-esteem, lifetime drug use and current smoking, but separately for girls – dissatisfaction and moderate satisfaction with own health and lifetime alcohol intoxication. Individual factors that independently increase the odds for suicide attempt in both gender groups are high and moderately high level of depressive symptoms, low and moderately low level of self-esteem, current smoking and dissatisfaction with

own health, but separately for girls – alcohol intoxication in lifetime and separately for boys – lifetime drug use.

**Conclusions.** Significant proportion of Latvian 14–17-year-old adolescents report lifetime suicidal ideation and suicide attempts, both types of suicidal behavior are more prevalent among girls. Significant association exists between suicidal behavior and factors related to family environment, peer environment and individual factors. It should be taken into consideration during the development of public mental health policy and in the planning of the suicide prevention interventions in adolescent population.

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## **ABBREVIATIONS**

CES-D Centre for Epidemiological Studies Depression Scale

EU European Union

ESPAD European School Survey Project on Alcohol and Other Drugs

MES Ministry of Education and Science

OR odds ratio

WHO World Health Organization

VIF variance inflation factor



# 1. INTRODUCTION

## 1.1. Novelty of the problem

Suicides have been and are a public health problem that leads to premature death, dramatically impacts the lives of family and loved ones, as well as causes economic losses for countries in general (World Health Organization [WHO], 2014a; Zhang, Tong and Zhou, 2005; Kinchin and Doran, 2018).

Suicide mortality in European region compared to other regions is high; nine countries with the highest suicide mortality in the world are located in this region, in several countries the number one cause of death of adolescents is suicide (WHO, 2015).

About 800,000 people worldwide die each year because of suicide, which amounts to one suicide victim every 40 seconds. Globally, suicide is the second most frequent cause of death in people aged 15–29. The number of people who attempt a suicide is significantly higher (WHO, 2018a).

Suicides are one of the most significant public health problems in Latvia – according to standardised mortality rates, the total population of Latvia ranks second among the EU Member States (Šica, Pulmanis and Taube, 2017), while adolescents aged 15–19 are ranked seventh (Eurostat, 2018). The most potential years of life lost in Latvia are due to external causes of death, among which suicides are the leading cause (Štāle, Treide and Rožkalne, 2016; Skrule, 2014).

Topicality of the problem of suicide and suicidal behaviour is clearly reflected in the Latvian Public Health Policy Guidelines for 2014–2020, where it is stated “Regarding high suicide rates, prevention of both – child and adult suicides and suicidal behaviour should be regarded as one of public health priorities in Latvia” (LR Ministru kabinets, 2014).

The problem in the population as a whole and among young people and adolescents is also highlighted in a number of policy planning documents at international level, including the WHO Mental Health Action Plan 2013–2020 (WHO, 2013) and the WHO European Mental Action Plan 2013–2020 (WHO, 2015).

Suicidal behaviour: suicidal ideation, suicide attempts, etc., are associated with different levels of risk of completed suicide and are often analysed in the research of associated risk factors (Bridge, Goldstein and Brent, 2006). There is no consensus in scientific literature on the definition of suicidal behaviour; therefore, different approaches exist (Goodfellow, Kőlves and De Leo, 2018; De Leo et al., 2006; WHO, 2014b). Definitions tend to be inaccurate and variable, particularly when it comes to suicidal behaviour without fatal outcome and suicidal ideation.

Suicidal behaviour is more prevalent among adolescents with a wide range of risk factors. Identifying these factors and examining the role and impact of each factor is important for prevention of suicides (Krug et al., 2002).

Data from studies carried out abroad show that psycho-emotional well-being of adolescents can be influenced by numerous factors related to family and peer environment, as well as individual factors of an adolescent, for example, supportive family relationships are associated with better mental health (Rothson, Goodwin and Stansfield, 2012); parental support can protect a child in disadvantaged, violent environment (Stadler et al., 2010; Wallen and Rubin, 1997); feelings of safety and belonging can reduce risk behaviour (Brooks et al., 2012); adolescents from emotionally supportive peer environments have a higher level of psycho-emotional well-being; these adolescents have higher social competence, as well as fewer emotional and behavioural problems (WHO, 2016; Kerr et al., 2003; Colarossi and Eccles, 2003; Lenzi et al., 2012).

Necessity of analysis of the potential impact of various risk factors of suicidal behaviour in Latvia is made especially important by the high prevalence of various factors related to suicidal behaviour in child and adolescent population of Latvia, such as domestic violence (Velika et al., 2012), peer violence, lack of emotional support (WHO, 2016), use of addictive substances (Sniķere and Trapencieris, 2016), etc.

Despite the high suicide rates in Latvia and the fact that currently around a third of the world's middle and high-income countries have developed and adopted individual suicide prevention strategies (WHO, 2018b), research on suicidal behaviour and associated risk factors in Latvia, particularly among children and adolescents, has so far been viewed as limited and insufficient.

In order to implement evidence-based suicide and suicidal behaviour prevention programmes, both in the population as a whole and in risk groups, it is necessary to acquire evidence-based knowledge specifically about adolescents in Latvia for the most accurate targeting of interventions.

## **1.2. Aim of the Thesis**

The aim of the Thesis was to assess prevalence of self-reported suicidal behaviour and its association with family and peer environment related factors, as well as individual factors in the population of 14 to 17-year-old adolescents in Latvia.

## **1.3. Objectives of the Thesis**

1. To find out prevalence of suicidal ideation and suicide attempts in sociodemographic groups of adolescents in Latvia.
2. To analyse gender-specific association between suicidal behaviour (suicidal ideation/suicide attempts) and factors related to family environment – not

living with both biological parents, lack of emotional support from parents, suicidal experience in the family, physical violence in the family, and sexual harassment in the family.

3. To analyse gender-specific association between suicidal behaviour (suicidal ideation/suicide attempts) and factors related to peer environment – lack of emotional support from peers, suicidal experience among peers, bullying at school.
4. To analyse gender-specific association between suicidal behaviour (suicidal ideation/suicide attempts) and individual factors – the level of depressive symptoms, the level of self-esteem, health self-assessment, harmful use of alcohol, current smoking, and drug use.
5. To provide recommendations based on conclusions of the Doctoral Thesis for interventions for the prevention of suicidal behaviour in 14 to 17-year-old adolescent population in Latvia and for future research on suicidal behaviour in adolescents.

#### **1.4. Hypotheses of the Thesis**

1. There is an association in both gender groups between adolescents' self-reported suicidal ideation and all studied family environment related, peer environment related and individual factors.
2. There is an association in both gender groups between adolescents' self-reported suicide attempts and all studied family environment related, peer environment related and individual factors.

## **2. MATERIAL AND METHODS**

### **2.1. Data sources and extraction**

The data from Latvia of the 2011 European School Survey Project on Alcohol and Other Drugs (ESPAD) collected by the Centre for Disease Prevention and Control of Latvia using standardised ESPAD methodology was used in the development of the Thesis.

The research tool was an approved standardised questionnaire in Latvian and Russian. A few individual questions in the questionnaire were adjusted based on validation in two focus group discussions with adolescents from the target group before commencing the field work. Separate modules of additional questions (including the psychosocial module) were also used in the questionnaire (Trapencieris et al., 2012). Both internationally standardised questions and specific questions asked to Latvian adolescents, which were developed by the participation of the author, have been used in the Thesis.

Study participants were selected by stratified random cluster sampling where the sampling unit was a class. The sample was selected according to the data of the Ministry of Education and Science (MES) about 8–10 grade classes and the number of pupils in the 2010/2011 school year (Trapencieris et al., 2012).

The survey was conducted in April and May, 2011. Pupils from 491 classes in 327 general education schools participated in the survey (Trapencieris et al., 2012).

### **2.2. Variable characteristics and grouping of the subjects**

In the Thesis, the following types of suicidal behaviour were analysed as dependent variables:

• **suicidal ideation during life-time** (hereinafter – suicidal ideation), determined by answering a question whether the respondent has ever thought about a specific method, place or action to commit a suicide. The responses were dichotomised by creating two groups – “yes” and “no”. In the view of the need to differentiate suicidal ideation with a comparatively higher risk of suicide attempt or suicide, in designing the question for the respondents, the approach of defining active suicidal ideation (“thoughts about taking action to end one’s life, including identifying a method, having a plan, or having intent to act”) (Turecki and Brent, 2016) was used;

• **suicide attempt during life-time** (hereinafter – suicide attempt), which was determined by answering an internationally used question of ESPAD whether and how many times the respondent had attempted suicide. The responses were dichotomised by creating two groups – “yes” and “no”. This question and approach have been used to identify self-reported suicide attempts by adolescents in a number of other studies using ESPAD data (Kokkevi et al., 2012; Kokkevi et al., 2011; Hibell et al., 2009).

The following groups of factors have been analysed as independent variables in the Thesis – **factors related to family environment:**

• **not living with both biological parents**, which was determined in accordance with the internationally used question of ESPAD by selecting people living in the same household with the respondent. The answers were dichotomised by creating two groups – “yes”, which was determined if the respondent noted that they do not live with both biological parents – father and mother, and “no”, which was determined if the respondent did not note living with both a father and a mother. A similar approach has also been used in other studies (Kokkevi et al., 2012; Zaborskis, Sirvyte and Zemaitiene, 2016; Kokkevi et al., 2011);

- **emotional support from parents** for which, according to the ESPAD internationally used question, respondents had to indicate how often the statement “I can easily get emotional support from my mother and/or father” applies to the respondent. The responses were grouped into three categories – “always/often”, “sometimes” and “rarely/never”;

- **suicidal experience in the family**, which was determined by two separate questions: “Has any of your family members tried to commit suicide?” and “Has any of your family members committed suicide?”. The answers were dichotomised by creating two groups – “yes” if the respondent gave a positive answer to one or both questions, and “no” if the respondent gave a negative answer to both questions;

- **physical domestic violence** which was identified by the responses to the statement “I was involved in physical violence in my home, involving an adult”. The answers were dichotomised by creating two groups – “yes” and “no”;

- **sexual harassment in the family**, which was identified by the responses to the statement “I experienced sexual harassment, involving an adult family member”. The answers were dichotomised by creating two groups – “yes” and “no”;

#### **factors related to peer environment:**

- **emotional support from peers**, for which, according to the internationally used question by ESPAD, respondents had to indicate how often the statement “I can easily get emotional support from my best friend” applies to the respondent. The responses were grouped into three categories – “always/often”, “sometimes” and “rarely/never”;

- **suicidal experience among peers**, which was determined by two separate questions: “Has any of your friends or acquaintances tried to commit suicide?” and “Has any of your friends or acquaintances committed suicide?”.

The answers were dichotomised by creating two groups – “yes” if the respondent gave a positive answer to one or both questions, and “no” if the respondent gave a negative answer to both questions;

- **bullying at school**, which was identified by responses to the statement “Classmates have bullied me by name-calling”. The responses were grouped into three categories – “always/often”, “sometimes” and “never”;

**individual factors:**

- **level of depressive symptoms** which was identified by using the short (six questions) scale of the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977), which has been used internationally within the ESPAD psychosocial module (Hibell et al., 2009). The purpose of the CES-D scale is to determine the level of depressive symptomatology in population and population groups (Radloff, 1977). CES-D is one of the scales recommended for the determination of different levels of depressive symptoms in adolescent population, but not for differentiation of clinical depression, since determination of cut-off scores for clinical depression may result in many false positives (Stockings et al., 2015). Validity of this short form of scale was evaluated by comparing it to the full CES-D scale in a survey of 5249 adolescents in school and was found to be satisfactory (Hibell et al., 2009). The respondents had to answer six questions, namely: “During the last 7 days, how often...” a. “have you lost your appetite, you did not want to eat”, b. “have you had difficulty in concentrating on what you want to do”, c. “have you felt depressed”, d. “have you felt that you had to put great effort and pressure to do the things you had to do”, e. “have you felt sad”, f. “couldn’t you do your work (at home, at work, at school)”. The responses to each question were – “rarely or never”, “sometimes”, “several times” and “most of the times”. In the interpretation of the results, the base of approach used in the ESPAD study (Hibell et al., 2009) was used, supplemented by the author of the Thesis:



depending on the answer, it was possible for the respondent to get 1 to 4 points to each of the questions. Three categories of the level of depressive symptoms were distinguished based on the obtained mean scores in quartiles – “low” if the score was in the lower two quartiles, while the two highest quartiles were proportionally divided into “moderately high” and “high” categories.

- **level of self-esteem**, which was determined by the Rosenberg’s Self-esteem Scale, which is a tool designed based on the concept of self-esteem, evaluating a person’s perceptions of one’s personal worth and self-acceptance (Rosenberg, 1965). Respondents had to indicate to what extent they agree with 10 statements: a. “On the whole, I am satisfied with myself”, b. “At times I think I am no good at all”, c. “I feel that I have a number of good qualities”, d. “I am able to do things as well as most other people”, e. “I feel I do not have much to be proud of”, f. “I certainly feel useless at time”, g. “I feel that I’m a person of worth, at least on an equal plane with others”, h. “I wish I could have more respect for myself”, i. “All in all, I am inclined to feel that I am a failure”, j. “I take a positive attitude toward myself”, of which five statements (a, c, d, g, j) are positive and five statements (b, e, f, h, i) are negative. In each of the statements, respondents had to indicate one of the answers – “strongly agree”, “agree”, “disagree” and “strongly disagree”. Depending on the response provided, it was possible for the respondent to obtain 1 to 4 points in ascending order, from 1 point if they picked “strongly agree” up to 4 points if the respondents picked “strongly disagree” in the negative statements, and in descending order from 4 points if the respondent picked “strongly agree” up to 1 point if the answer was “strongly disagree” in the positive statements. In interpreting the results, the base of approach used in the ESPAD study (Hibell et al., 2009) was used, supplemented by the author of the Thesis: three categories of the level of self-esteem were distinguished based on the obtained mean scores in quartiles – “high” if the score was in the higher two quartiles,

while the two lowest quartiles were proportionally divided into “moderately low” and “low” categories.

- **satisfaction with own health**, which was determined by answering the internationally used question of ESPAD: “How satisfied are you usually with your health?”. The responses were combined by creating three categories – “dissatisfied”, “moderately satisfied” and “satisfied”;

- **alcohol intoxication**, which was determined by respondents’ answers to the internationally used question: “On how many occasions (if any) have you been intoxicated from drinking alcoholic beverages, for example staggered when walking, not being able to speak properly, throwing up or not remembering what happened?”. The responses were combined by creating three categories – “none”, “1 to 2 times” and “3 or more times”. This type of alcohol use (intoxication) is considered to be one of the drinking habits that characterises a pattern of risky use of alcohol (Trapencieris et al., 2012), and merging responses as previously mentioned is in line with the analysis of international data of ESPAD, determining the association between the number of times of intoxication and psychosocial variables studied (Hibell et al., 2009);

- **current smoking**, which was determined by indicating the response to the internationally used question: “How frequently have you smoked cigarettes during the last 30 days?”. The responses were dichotomised by creating two groups – “yes” if the respondent had smoked at least one cigarette per day and “no” if the respondent smoked less than 1 cigarette a day or had not smoked. This approach has also been used in another study (Kokkevi et al., 2012) to identify current smokers;

- **drug use**, which was determined according to international ESPAD questions by indicating on how many occasions in lifetime (if any) a respondent has used any of the following drugs (separate question for each substance) – marijuana/hashish, amphetamine, LSD/other hallucinogens, crack,

cocaine, heroin, ecstasy or spice. The responses were dichotomised by creating two groups – “yes” if the respondent had selected any of the responses indicating having tried one or more of the substances during his life, and “no” if the respondent noted not having tried any of the substances. This approach has also been used in another study (Kokkevi et al., 2012).

**and socio-demographic characteristics:**

- **gender** – boy or girl;
- **age**, which was calculated based on of the information provided by the respondent on the year and month of birth, considering the year and month of the survey. Thus, the age of the pupil was calculated for the month in which the survey was conducted, and two age groups of respondents were established – 14 to 15-year-olds and 16–17-year-olds. According to international recommendations, adolescents are considered to be from 10 to 19 years of age (WHO, 2017), which includes the age groups studied in the Thesis.

- **material status of the family**, which was determined, according to the internationally used question of the ESPAD, by indicating how well off a respondent’s family is compared to other families in the country. The responses were combined by creating three categories: “low”, “medium” and “high” Studies have shown that the subjective socio-economic status measurement also represents personal experience (Singh-Manoux, Adler and Marmot, 2003) related to the socio-economic situation and may have a more relevant relationship with psycho-emotional well-being than objective socio-economic status measurements (Sweeting and Hunt, 2014) in adolescence.

### **2.3. Characteristics of the study population**

Overall, the data analysis includes 7,299 respondents aged 14 to 17 – 3,471 (47.6 %) boys and 3,828 (52.4 %) girls. The average age of the respondents was 15.5 years (standard deviation 0.95). The breakdown of

respondents in age groups was as follows: 14–15 years – 3,670 (50.3 %); 16–17 years – 3,629 (49.7 %). The breakdown of respondents by the place of residence was as follows: Riga – 1,767 (24.2 %); big cities – 1,766 (24.2 %); other cities – 2,404 (32.9 %); rural areas – 1,362 (18.7 %).

## **2.4. Statistical analysis**

According to the aim and tasks of the Thesis, a gender-specific analysis was performed.

Descriptive statistical methods were used for data analysis: frequency distribution, calculation of the mean value, and Chi-square test was used for the comparison of respondent subgroups in 2 x 2 tables, while for comparison of independent groups exceeding two groups, the method used was the determination of binomial proportion confidence interval by using Wilson Score Interval Method (Newcombe, 1998).

Spearman's correlation coefficient was used to determine correlations between the types of suicidal behaviour, also as the first step in testing collinearity between independent variables in multivariate logistic regression models.

To determine the association between the dependent and independent variables, the calculation of odds ratio was used.

Gender-specific associations between different factors and adolescent suicidal behaviour was analysed in multi-variate logic regression models. A separate multi-variate regression analysis has been performed for each type of suicidal behaviour and factors in three separate groups – factors related to family environment, factors associated with peer environment and individual factors.

In order to select variables to be included in multi-variate regression models, the purposeful selection method was used, where as the first step the

association of each independent variable with the outcome was assessed by using univariate regression analysis, multi-variate regression models include variables with a p value of less than 0.25 and those variables whose impact in univariate regression analysis is not statistically significant, but they are relevant in the context of the established model (Zhang, 2016).

According to the results of the univariate regression analysis, all studied variables related to the family environment, variables characterising peer environment, individual variables, and variables related to sociodemographic characteristics were included in multi-variate regression models (the results of univariate analysis are described in detail in the full version of the Thesis, only multi-variate models are described in the summary of the Thesis).

Independent variables included in the regression models were tested for collinearity, to determine whether the independent features do not mutually correlate too closely. In the event of a close relationship between independent variables, no conclusions can be drawn which of the independent variables affect the dependent variable. Spearman's correlation coefficient, Tolerance test, and variance inflation factor (VIF) were used to test collinearity. The value of the Tolerance test of less than 0.1 and the value of the VIF which is greater than 10, indicates the collinearity of the independent regression variables (Field, 2013). The collinearity test among independent variables in gender groups showed that collinearity does not prevent conclusions from being drawn about the effect of the independent variables included in regression models on dependent variables – suicidal ideation and suicide attempts.

Value of (p) 0.05 was defined for all statistical tests and the results were found to be statistically significant if the p value was lower than the defined value.

Software MS Excel and IBM SPSS were used for data analysis.

### 3. RESULTS

#### 3.1. Suicidal behaviour in socio-demographic groups

Overall, 15.7 % ( $n = 1142$ ; 95 % TI = 14.9–16.6) of the respondents noted having experienced suicidal ideation; of those 11.7 % ( $n = 404$ ; 95 % TI = 10.7–12.9) were boys and 19.4 % ( $n = 738$ ; 95 % TI = 18.1–20.7) were girls, but suicide attempt was noted by 8.2 % ( $n = 594$ ; 95 % TI = 7.6–8.8) of the respondents – 5.9 % ( $n = 205$ ; 95 % TI = 5.2–6.8) of boys and 10.2 % ( $n = 389$ ; 95 % TI = 9.3–11.2) of girls. Differences in gender groups are statistically significant in both – the prevalence of suicidal ideation ( $p < 0.001$ ,  $df = 1$ ,  $\chi^2 = 79.31$ ) and suicide attempts ( $p < 0.05$ ,  $df = 1$ ,  $\chi^2 = 43.65$ ).

There are also statistically significant differences in the prevalence of suicidal ideation in adolescent age groups in boys ( $p < 0.05$ ,  $df = 1$ ,  $\chi^2 = 4.25$ ) and girls ( $p < 0.05$ ,  $df = 1$ ,  $\chi^2 = 5.25$ ), but there were no statistically significant differences in the prevalence of suicide attempts in boys ( $p > 0.05$ ,  $df = 1$ ,  $\chi^2 = 0.77$ ), or girls ( $p > 0.05$ ,  $df = 1$ ,  $\chi^2 = 0.15$ ) (see Figure 3.1).

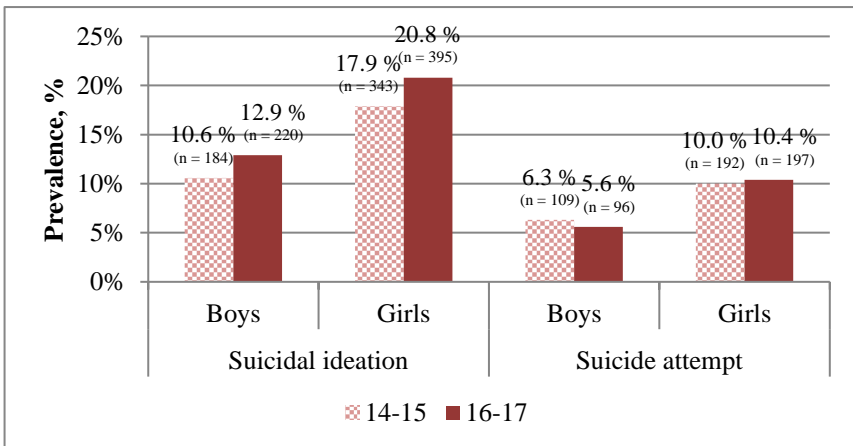


Figure 3.1 Prevalence of suicidal behaviour in gender and age groups, %

Analysis of the statistical significance intervals of the percentage differences shows that suicidal ideation is statistically more common among adolescents of both genders who rated material status of their family as low, while higher prevalence of suicide attempts in low material status category are statistically significant only for girls (see Table 3.1).

Table 3.1

**Prevalence of suicidal behaviour in the categories of material status of the family in gender groups**

Suicidal ideation		Material status of the family		
		Low	Medium	High
Boys	n	52	132	218
	% (95 % TI)	19.8* (15.4–25.0)	11.4 (9.7–13.3)	11.0 (9.7–12.5)
Girls	n	112	301	315
	% (95 % TI)	30.9* (26.4–35.9)	19.7 (17.7–21.7)	16.7 (15.1–18.5)
Suicide attempt		Material status of the family		
		Low	Medium	High
Boys	n	20	63	121
	% (95 % TI)	7.5 (4.9–11.3)	5.4 (4.2–6.9)	6.1 (5.1–7.2)
Girls	n	57	151	176
	% (95 % TI)	15.6* (12.2–19.7)	9.8 (8.4–11.4)	9.3 (8.1–10.7)

\* Statistically significant differences.

### 3.2. Interrelation of suicidal behaviour

Of the respondents who reported suicide attempts, 66.5 % (n = 391; 95 % CI = 62.6–70.2) also reported suicidal ideation, while of the respondents who reported suicidal ideation, 34.4 % (n = 391; 95 % CI = 31.7–37.2) also noted suicide attempt. Correlation between the studied types of suicidal behaviour is statistically significant and Spearman's correlation coefficient 0.41 indicates

that there is a weak correlation between the types of suicidal behaviour studied (Hinkle, Wiersma and Jurs, 2003).

### **3.3. Suicidal behaviour and factors related to family environment**

The association between adolescent suicidal behaviour and factors related to family environment has been analysed in multi-variate regression models. In “model 1”, each factor was adjusted for the respondent’s age and the material status of the family. Factors in “model 2” were adjusted for the respondent’s age, material status of the family and other studied factors related to family environment. Both multi-variate regression models were created for each gender group in each type of suicidal behaviour, together creating 8 models (see Tables 3.2 to 3.5).

When analysing the association between suicidal ideation and not living with both biological parents, it was observed that in “model 1”, boys who do not live with both biological parents had almost two times (OR = 1.9) higher odds for suicidal ideation and after adjusting in “model 2” – 1.3 times higher odds, when compared to boys living with both biological parents, while for the girls who do not live with both biological parents odds for suicidal ideation in “model 1” were 1.4 times higher, when compared to girls living with both biological parents, but after adjusting in “model 2”, the association was no longer statistically significant (see Tables 3.2 to 3.3).

When analysing the association between suicide attempt and not living with both biological parents, it was observed that in “model 1”, boys who do not live with both biological parents had 3.2 times higher odds for suicide attempt, but after adjusting in “model 2” – 2.1 times higher odds, when compared to boys living with both biological parents. While for the girls who do not live with both biological parents in “model 1” the odds for suicide attempt were almost two times (OR = 1.8) higher, but after adjusting in “model



2” –1.4 times higher, when compared to girls living with both biological parents (see Tables 3.4 to 3.5).

When analysing the association between emotional support from parents and suicidal ideation, it was observed that in “model 1” for boys who rarely/never receive emotional support from parents odds for suicidal ideation were 3.1 times higher, for boys who receive emotional support from parents sometimes – 1.7 times higher, but after adjusting in “model 2”, the odds for suicidal ideation were respectively 2.3 and 1.4 times higher, when compared to boys receiving emotional support from parents always/often. While for the girls in “model 1” rarely/never received emotional support from parents increased the odds for suicidal ideation 3.4 times, sometimes received emotional support – 2.4 times, but after adjusting in “model 2”, the odds for suicidal ideation were respectively 2.5 and 2 times higher, when compared to girls receiving emotional support from parents always/often (see Tables 3.2 to 3.3).

Regarding suicide attempts, in “model 1” for boys rarely/never received emotional support from parents increased the odds for suicide attempt 3.7 times, while in “model 2” – 2.4 times, when compared to boys receiving emotional support from parents always/often. The association for boys between attempted suicide and sometimes received emotional support from parents, both in univariate analysis and after adjusting in “model 1” and “model 2”, was not statistically significant. While for girls in “model 1” rarely/never received emotional support from parents increased the odds for suicide attempt 3.3 times, sometimes received emotional support – 2.4 times, but after adjusting in “model 2”, the odds for suicide attempt were respectively 2.2 and nearly 2 (OR = 1.9) times higher when compared to girls who receive emotional support from parents always/often (see Tables 3.4 to 3.5).

Suicidal experience in the family for boys in “model 1” increases the odds for suicidal ideation 13.3 times, but after adjusting in “model 2” – 8.5

times, when compared to boys with no suicidal experience in the family. For girls suicidal experience in the family in “model 1” increases the odds for suicidal ideation 3.5 times, but after adjusting in “model 2” – 2.5 times, when compared to girls with no suicidal experience in the family (see Tables 3.2 to 3.3).

Regarding suicide attempts, suicidal experience in the family for boys in “model 1” increases the odds for suicide attempts 9.3 times, but after adjusting in “model 2” – 3.5 times, when compared to boys with no suicidal experience in the family. For girls suicidal experience in the family in “model 1” increases the odds for suicide attempt 4.2 times, but after adjusting in “model 2” – 3 times, when compared to girls with no suicidal experiences in the family (see Tables 3.4 to 3.5).

Physical domestic violence in “model 1” increases the odds for suicidal ideation in boys 5.4 times, but after adjusting in “model 2” – 2.5 times, when compared to boys with no experience of physical domestic violence. Among girls in “model 1” physical domestic violence increases the odds for suicidal ideation 3.7 times, but after adjusting in “model 2” – 2.4 times, when compared to girls without such experience (see Tables 3.2 to 3.3).

In the context of suicide attempts, physical domestic violence in “model 1” increases the odds for suicide attempt 8.2 times for boys, but after adjusting in “model 2” – 3 times, compared to boys without such experience. Among girls in “model 1”, physical domestic violence increases the odds for suicide attempt 3.2 times, but after adjusting in “model 2” – almost two times (OR = 1.9), when compared to girls without such experiences (see Tables 3.4 to 3.5).

Sexual harassment in the family in “model 1” increases the odds for suicidal ideation for boys 10.4 times, when compared to boys who have not experienced sexual harassment, but after adjusting in “model 2”, the association was no longer statistically significant. Among girls sexual harassment in the

family in “model 1” increases the odds of suicidal ideation 3.2 times, but after adjusting in “model 2”, the association was no longer statistically significant (see Tables 3.2 to 3.3).

Regarding suicide attempts, sexual harassment in the family in “model 1” increases the odds for suicide attempt in boys 16.1 times, when compared to boys who have not experienced sexual harassment, but after adjusting in “model 2” – 3.1 times. Among girls after adjusting in “model 1”, sexual harassment in family increases the odds for suicide attempt 3.5 times, but after adjusting in “model 2” the association was no longer statistically significant (see Tables 3.4 to 3.5).

Table 3.2

**Multi-variate logistic regression models for association between adolescent suicidal ideation and factors related to family environment in boys**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Not living with both biological parents</i></b>				
Yes	1.9 (1.6–2.4)	p < 0.001	1.3 (1.0–1.6)	p < 0.05
No	1.0		1.0	
<b><i>Emotional support from parents</i></b>				
Rarely/never	3.1 (2.3–4.2)	p < 0.001	2.3 (1.7–3.3)	p < 0.001
Sometimes	1.7 (1.3–2.3)	p < 0.001	1.4 (1.0–2.0)	p < 0.05
Always/often	1.0		1.0	
<b><i>Suicidal experience in family</i></b>				
Yes	13.3 (10.2–17.4)	p < 0.001	8.5 (6.3–11.6)	p < 0.001
No	1.0		1.0	
<b><i>Physical domestic violence</i></b>				
Yes	5.4 (4.2–6.9)	p < 0.001	2.5 (1.8–3.4)	p < 0.001
No	1.0		1.0	
<b><i>Sexual harassment in family</i></b>				
Yes	10.4 (7.0–15.5)	p < 0.001	1.6 (0.9–2.7)	p > 0.05
No			1.0	

\* Adjusted for the respondent’s age and material status of the family.

\*\* Adjusted for the respondent’s age, material status of the family and studied factors related to family environment.

Table 3.3

**Multi-variate logistic regression models for association between adolescent suicidal ideation and factors related to family environment in girls**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Not living with both biological parents</i></b>				
Yes	1.4 (1.2–1.6)	p < 0.001	1.1 (1.0–1.4)	p > 0.05
No	1.0		1.0	
<b><i>Emotional support from parents</i></b>				
Rarely/never	3.4 (2.7–4.4)	p < 0.001	2.5 (1.9–3.3)	p < 0.001
Sometimes	2.4 (1.9–3.0)	p < 0.001	2.0 (1.6–2.5)	p < 0.001
Always/often	1.0		1.0	
<b><i>Suicidal experience in family</i></b>				
Yes	3.5 (2.8–4.4)	p < 0.001	2.5 (2.0–3.2)	p < 0.001
No	1.0		1.0	
<b><i>Physical domestic violence</i></b>				
Yes	3.7 (3.0–4.6)	p < 0.001	2.4 (1.9–3.1)	p < 0.001
No	1.0		1.0	
<b><i>Sexual harassment in family</i></b>				
Yes	3.2 (1.8–5.9)	p < 0.001	1.5 (0.8–3.0)	p > 0.05
No	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied factors related to family environment.

Table 3.4

**Multi-variate logistic regression models for association between adolescent suicide attempts and factors related to family environment in boys**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Not living with both biological parents</i></b>				
Yes	3.2 (2.4–4.4)	p < 0.001	2.1 (1.5–3.0)	p < 0.001
No	1.0		1.0	
<b><i>Emotional support from parents</i></b>				
Rarely/never	3.7 (2.6–5.4)	p < 0.001	2.4 (1.5–3.6)	p < 0.001
Sometimes	1.4 (0.9–2.2)	p > 0.05	1.0 (0.6–1.5)	p > 0.05
Always/often	1.0		1.0	
<b><i>Suicidal experience in family</i></b>				
Yes	9.3 (6.8–12.9)	p < 0.001	3.5 (2.3–5.2)	p < 0.001
No	1.0		1.0	
<b><i>Physical domestic violence</i></b>				
Yes	8.2 (6.0–11.2)	p < 0.001	3.0 (2.0–4.5)	p < 0.001
No	1.0		1.0	
<b><i>Sexual harassment in family</i></b>				
Yes	16.1 (10.6–24.5)	p < 0.001	3.1 (1.8–5.5)	p < 0.001
No	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied factors related to family environment.

Table 3.5

**Multi-variate logistic regression models for association between adolescent suicide attempts and factors related to family environment in girls**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Not living with both biological parents</i></b>				
Yes	1.8 (1.4–2.2)	p < 0.001	1.4 (1.1–1.8)	p < 0.05
No	1.0		1.0	
<b><i>Emotional support from parents</i></b>				
Rarely/never	3.3 (2.4–4.4)	p < 0.001	2.2 (1.6–3.0)	p < 0.001
Sometimes	2.4 (1.8–3.1)	p < 0.001	1.9 (1.4–2.5)	p < 0.001
Always/often	1.0		1.0	
<b><i>Suicidal experience in family</i></b>				
Yes	4.2 (3.3–5.4)	p < 0.001	3.0 (2.3–3.9)	p < 0.001
No	1.0		1.0	
<b><i>Physical domestic violence</i></b>				
Yes	3.2 (2.5–4.2)	p < 0.001	1.9 (1.4–2.6)	p < 0.001
No	1.0		1.0	
<b><i>Sexual harassment in family</i></b>				
Yes	3.5 (1.8–6.8)	p < 0.001	1.7 (0.8–3.6)	p > 0.05
No	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied factors related to family environment.

### 3.4. Suicidal behaviour and factors related to peer environment

Association between adolescent suicidal behaviour and factors related to peer environment has been analysed in multi-variate regression models. In “model 1”, each factor was adjusted for the respondent's age and material status of the family. Factors in “model 2” were adjusted for the respondent's age, material status of the family and other studied factors related to peer environment. Both multi-variate regression models were created for each

gender group in each type of suicidal behaviour, together creating 8 models (see Tables 3.6 to 3.9).

Rarely/never received emotional support from peers in “model 1” increased the odds for suicidal ideation in boys 1.3 times, when compared to boys who have received emotional support from peers always/often, but after adjusting in “model 2”, the association was no longer statistically significant. Similarly, the association in boys between suicidal ideation and sometimes received emotional support from peers, both in univariate analysis and after adjusting in “model 1” and in “model 2”, was not statistically significant. While for girls in “model 1” rarely/never received emotional support from peers increased the odds for suicidal ideation 1.7 times, sometimes received emotional support from peers – 1.4 times, but after adjusting in “model 2”, the odds for suicidal ideation were respectively 1.5 and 1.3 times higher, when compared to girls who receive emotional support from peers always/often (see Tables 3.6 to 3.7).

Regarding suicide attempts, rarely/never received emotional support and sometimes received support from peers show no statically significant increase in odds in boys in neither univariate analysis, neither in “model 1” nor “model 2”. While in girls who receive emotional support from peers rarely/never the odds for suicide attempt increase by almost two times ( $OR = 1.9$ ) in “model 1”, when compared to girls who receive emotional support always/often, while there is no statistically significant increase in the odds for suicide attempt in girls who receive emotional support from peers only sometimes. After adjusting in “model 2”, girls who received emotional support from peers rarely/never had 1.6 times higher odds for suicide attempt, while the association between suicide attempt and category “sometimes” for girls was not statistically significant (see Table 3.8 to 3.9).

Suicidal experience among peers in “model 1” increases odds for suicidal ideation in boys almost 8 times ( $OR = 7.9$ ), but after adjusting in “model 2” – 7.7 times, when compared to boys without suicidal experience among peers. In girls in “model 1” suicidal experience among peers increase suicidal ideation 3.5 times, but after adjusting in “model 2” – 3.3 times, when compared to girls with no suicidal experience among peers (see Tables 3.6 to 3.7).

Regarding suicide attempts, suicidal experience among peers in “model 1” increases the odds for suicide attempts almost seven ( $OR = 6.8$ ) times for boys, but after adjusting in “model 2” – 6.5 times, when compared to boys without suicidal experience among peers. Suicidal experience among peers in “model 1” increases the odds for suicide attempt in girls almost 5 ( $OR = 4.8$ ) times, but after adjusting in “model 2” – 4.5 times, when compared to girls with no suicidal experience among peers (see Tables 3.8 to 3.9).

Always/often experienced bullying at school in “model 1” increases the odds for suicidal ideation in boys four times, while for boys who were bullied sometimes odds were 1.5 times higher, but after adjusting in “model 2” the odds for suicidal ideation was 3.7 and 1.5 respectively, comparing to boys who were not bullied at school. While the odds for suicidal ideation in girls who always/often experience bullying at school were 3.1 times higher in “model 1”, in the case of sometimes experienced bullying increased the odds were almost two times ( $OR = 1.8$ ) higher, but after adjusting in “model 2”, the odds for suicidal ideation was respectively 2.5 and 1.6 times higher, when compared to girls who have not experienced bullying at school (see Tables 3.6 to 3.7).

In relation to suicide attempts always/often experienced bullying at school in “model 1” increased the odds for suicide attempt in boys almost four times ( $OR = 3.8$ ), while for boys who were bullied sometimes the odds increased almost two times ( $OR = 1.8$ ), but after adjusting in “model 2” the



odds for suicide attempt was respectively 3.1 and 1.7 times higher, compared to boys who were not bullied at school. In girls who had always/often experienced bullying at school the odds for suicide attempt was three times higher in “model 1”, in the case of sometimes experienced bullying – almost two times higher (OR = 1.9), but after adjusting in “model 2”, the odds for suicide attempt were respectively 2.3 and 1.7 times higher when compared to girls who did not experience bullying at school (see Tables 3.8 to 3.9).

Table 3.6

**Multi-variate logistic regression models for association between adolescent suicidal ideation and factors related to peer environment in boys**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Emotional support from peers</i></b>				
Rarely/never	1.3 (1.0–1.8)	p < 0.05	1.3 (0.9–1.8)	p > 0.05
Sometimes	0.8 (0.6–1.1)	p > 0.05	0.9 (0.7–1.2)	p > 0.05
Always/often	1.0		1.0	
<b><i>Suicidal experience among peers</i></b>				
Yes	7.9 (6.3–9.9)	p < 0.001	7.7 (6.1–9.7)	p < 0.001
No	1.0		1.0	
<b><i>Bullying at school</i></b>				
Always/often	4.0 (2.9–5.6)	p < 0.001	3.7 (2.6–5.4)	p < 0.001
Sometimes	1.5 (1.2–2.0)	p < 0.05	1.5 (1.1–1.9)	p < 0.05
Never	1.0		1.0	

\* Adjusted for the respondent’s age and material status of the family.

\*\* Adjusted for the respondent’s age, material status of the family and studied factors related to peer environment.

Table 3.7

**Multi-variate logistic regression models for association between adolescent suicidal ideation and factors related to peer environment in girls**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Emotional support from peers</i></b>				
Rarely/never	1.7 (1.3–2.4)	p < 0.05	1.5 (1.1–2.1)	p < 0.05
Sometimes	1.4 (1.1–1.7)	p < 0.05	1.3 (1.0–1.7)	p < 0.05
Always/often	1.0		1.0	
<b><i>Suicidal experience among peers</i></b>				
Yes	3.5 (2.9–4.1)	p < 0.001	3.3 (2.8–3.9)	p < 0.001
No	1.0		1.0	
<b><i>Bullying at school</i></b>				
Always/often	3.1 (2.3–4.2)	p < 0.001	2.5 (1.8–3.5)	p < 0.001
Sometimes	1.8 (1.5–2.2)	p < 0.001	1.6 (1.4–2.0)	p < 0.001
Never	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied factors related to peer environment.

Table 3.8

**Multi-variate logistic regression models for association between adolescent suicide attempts and factors associated with peer environment in boys**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Emotional support from peers</i></b>				
Rarely/never	1.3 (0.9–1.9)	p > 0.05	1.2 (0.8–1.9)	p > 0.05
Sometimes	0.9 (0.6–1.4)	p > 0.05	1.0 (0.7–1.5)	p > 0.05
Always/often	1.0		1.0	
<b><i>Suicidal experience among peers</i></b>				
Yes	6.8 (5.1–9.2)	p < 0.001	6.5 (4.7–8.8)	p < 0.001
No	1.0		1.0	
<b><i>Bullying at school</i></b>				
Always/often	3.8 (2.4–6.0)	p < 0.001	3.1 (1.9–5.1)	p < 0.001
Sometimes	1.8 (1.2–2.5)	p < 0.05	1.7 (1.1–2.4)	p < 0.05
Never	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied factors related to peer environment.

Table 3.9

**Multi-variate logistic regression models for association between adolescent suicide attempts and factors associated with peer environment in girls**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Emotional support from peers</i></b>				
Rarely/never	1.9 (1.3–2.7)	p < 0.05	1.6 (1.1–2.4)	p < 0.05
Sometimes	1.3 (0.9–1.7)	p > 0.05	1.2 (0.9–1.7)	p > 0.05
Always/often	1.0		1.0	
<b><i>Suicidal experience among peers</i></b>				
Yes	4.8 (3.8–6.0)	p < 0.001	4.5 (3.6–5.7)	p < 0.001
No	1.0		1.0	
<b><i>Bullying at school</i></b>				
Always/often	3.0 (2.1–4.4)	p < 0.001	2.3 (1.6–3.5)	p < 0.001
Sometimes	1.9 (1.5–2.4)	p < 0.001	1.7 (1.3–2.2)	p < 0.001
Never	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied factors related to peer environment.

### 3.5. Suicidal behaviour and individual factors

Association between adolescent suicidal behaviour and individual factors has been analysed in multi-variate regression models. In “model 1”, each factor was adjusted for the respondent's age and material status of the family. Factors in “model 2” were adjusted for the respondent's age, material status of the family and other individual factors studied. Both multi-variate regression models were created for each gender group in each type of suicidal behaviour, together creating 8 models (see Tables 3.10 to 3.13).

High level of depressive symptoms in “model 1” increased the odds for suicidal ideation in boys almost six times (OR = 5.9), while moderately high level of depressive symptoms increased the odds 2.1 times. After adjusting in

“model 2” the odds for suicidal ideation in boys were respectively 3.7 and 1.7 times higher, when compared to boys with low level of depressive symptoms. In girls high level of depressive symptoms increased the odds for suicidal ideation 5.1 times in “model 1”, while moderately high level of depressive symptoms – 2.1 times. After adjusting in “model 2”, the odds for suicidal ideation were respectively three times and 1.7 times higher, when compared to girls with low level of depressive symptoms (see Tables 3.10 to 3.11).

Regarding suicide attempts, high level of depressive symptoms increased the odds for suicide attempts in boys almost seven times (OR = 6.8) in “model 1”, while moderately high level of depressive symptoms increased the odds 2.4 times. In “model 2” the odds for suicide attempt in boys were respectively 3.5 and 2 times higher, when compared to boys with low level of depressive symptoms. Meanwhile for girls in “model 1” high level of depressive symptoms increased the odds for suicide attempt almost five times (OR = 4.8), while moderately high level of depressive symptoms – 2.1 times. In “model 2” the odds for suicide attempt in girls were respectively almost three times (OR = 2.8) and 1.7 times higher, when compared to girls with low level of depressive symptoms (see Tables 3.12 to 3.13).

Low level of self-esteem increased the odds for suicidal ideation in boys almost six times (OR = 5.9) in “model 1”, moderately low level of self-esteem - 2 times, but in “model 2” the odds for suicidal ideation for boys were respectively almost four (OR = 3.8) and two times higher when compared to boys with high level of self-esteem. In girls, low level of self-esteem increased the odds for suicidal ideation 3.7 times in “model 1”, while moderately low level of self-esteem – 1.7 times. After adjusting in “model 2”, the odds for suicidal ideation in girls were respectively 2.3 and 1.4 times higher, when compared to girls with high level of self-esteem (see Tables 3.10 to 3.11).

Regarding suicide attempts, low level of self-esteem in boys increased the odds for suicide attempt 8 times in “model 1”, while moderately low level of self-esteem almost three times ( $OR = 2.9$ ), but after adjusting in “model 2”, the odds for suicide attempt were respectively 5.1 and 2.4 times higher, when compared to boys with high level of self-esteem. In girls, in “model 1” low level of self-esteem increased the odds for suicide attempt 3.7 times, while moderately low level of self-esteem – two times, but after adjusting in “model 2”, the odds for suicide attempt were respectively 2.3 and 1.6 times higher, when compared to girls with high level of self-esteem (see Tables 3.12 to 3.13).

Dissatisfaction with own health in boys increased the odds for suicidal ideation 2.7 times in “model 1”, while moderate satisfaction – almost two times ( $OR = 1.9$ ), when compared to boys who were satisfied with their own health, while in “model 2” association between suicidal ideation and dissatisfaction or moderate satisfaction with own health in boys was not statistically significant. While in girls dissatisfaction with own health increased the odds for suicidal ideation 3.5 times in “model 1”, moderate satisfaction – 2.1 times, but after adjusting in “model 2”, the odds for suicidal ideation were respectively 2.1 and 1.5 times higher, when compared to girls who were satisfied with their own health (see Tables 3.10 to 3.11).

In relation to suicide attempts, dissatisfaction with own health in boys increased the odds for suicide attempts 4.6 times in “model 1”, 2.6 times higher odds were observed in boys with moderate satisfaction with own health, while in “model 2” dissatisfaction with own health increased the odds for suicide attempts 2.1 times, but the association between moderate satisfaction with health and suicide attempts was not statistically significant for boys. For girls, dissatisfaction with own health increased the odds for suicide attempt 3.5 times in “model 1”, moderate satisfaction – almost two times ( $OR = 1.8$ ), but in “model 2” the odds for suicide attempt were 2.1 times higher for girls who were

dissatisfied with their own health, when compared to girls who were satisfied. No statistically significant higher odds for suicide attempt were observed in girls who were moderately satisfied with their own health in “model 2” (see Tables 3.12 to 3.13).

Alcohol intoxication 3 and more times during lifetime in boys increased the odds for suicidal ideation almost two times ( $OR = 1.8$ ) in “model 1”, while alcohol intoxication once or twice – 1.3 times, when compared to boys who have not been intoxicated from alcohol. The association between alcohol intoxication and suicidal ideation in boys was not statistically significant after adjusting in “model 2”. For girls in “model 1” alcohol intoxication 3 and more times increased the odds for suicidal ideation almost three times ( $OR = 2.9$ ), but alcohol intoxication once or twice – 1.7 times, while after adjusting in “model 2”, the odds for suicidal ideation were respectively almost two ( $OR = 1.8$ ) and 1.3 times higher, when compared to girls who have not been intoxicated from alcohol (see Tables 3.10 to 3.11).

Regarding suicide attempts, alcohol intoxication 3 and more times in lifetime for boys in “model 1” increased the odds for suicide attempt two times, when compared to boys who have not been intoxicated from alcohol, while the association between alcohol intoxication once or twice and suicide attempt in boys was not statistically significant in “model 1”, as well as associations between alcohol intoxication and suicide attempt in “model 2”. In girls, in “model 1” alcohol intoxication 3 and more times increased the odds for suicide attempt almost three times ( $OR = 2.9$ ), intoxication once or twice – 2.3 times, but after adjusting in “model 2”, the odds for suicide attempt for girls were almost two ( $OR = 1.8$ ) times higher in both intoxication categories, when compared to girls who have not been intoxicated from alcohol (see Tables 3.12 to 3.13).

Current smoking after adjusting in “model 1” increased the odds for suicidal ideation in boys almost 2 times ( $OR = 1.9$ ), but after adjusting in “model 2” – 1.3 times, when compared to boys who are not current smokers. Current smoking in girls increased the odds for suicidal ideation 2.1 times in “model” 1, but after adjusting in “model 2” – 1.4 times, when compared to girls who are not current smokers (see Tables 3.10 to 3.11).

In the context of suicide attempts, current smoking in boys increased the odds for suicide attempt almost three times ( $OR = 2.8$ ) in “model 1”, but after adjusting in “model 2” – 2.3 times, when compared to boys who are not current smokers. Current smoking among girls increased the odds for suicide attempt 2.5 times in “model 1”, but after adjusting in “model 2” – almost two times ( $OR = 1.8$ ), when compared to girls who are not current smokers (see Tables 3.12 to 3.13).

Use of drugs during life-time in boys increased the odds for suicidal ideation 2.2 times in “model 1”, but after adjusting in “model 2” – 1.4 times, when compared to boys who have not used any of marijuana/hashish, amphetamine, LSD/other hallucinogens, crack, cocaine, heroin, ecstasy or spice. In girls use of drugs increased the odds for suicidal ideation 2.1 times in “model 1”, but after adjusting in “model 2” – 1.4 times, when compared to girls who have not used previously mentioned drugs (see Tables 3.10 to 3.11).

Regarding suicide attempts, the use of drugs during lifetime in boys increased the odds for suicide attempt three times in “model 1”, but after adjusting in “model 2” – 1.7 times, when compared to boys who have not used previously mentioned drugs. Among girls, the use of drugs increased the odds for suicide attempt 2.1 times in “model 1”, when compared to girls who have not used previously mentioned drugs, while in “model 2” the association between drug use and suicide attempts in girls was not statistically significant (see Table 3.12 to 3.13).



Table 3.10

**Multi-variate logistic regression models for association between adolescent suicidal ideation and individual factors in boys**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Level of depressive symptoms</i></b>				
High	5.9 (4.5–7.8)	p < 0.001	3.7 (2.7–5.1)	p < 0.001
Moderately high	2.1 (1.6–2.7)	p < 0.001	1.7 (1.3–2.3)	p < 0.001
Low	1.0		1.0	
<b><i>Level of self-esteem</i></b>				
Low	5.9 (4.4–7.8)	p < 0.001	3.8 (2.8–5.2)	p < 0.001
Moderately low	2.5 (1.9–3.5)	p < 0.001	2.0 (1.4–2.7)	p < 0.001
High	1.0		1.0	
<b><i>Satisfaction with own health</i></b>				
Dissatisfied	2.7 (1.8–4.0)	p < 0.001	1.3 (0.8–2.0)	p > 0.05
Moderately satisfied	1.9 (1.4–2.7)	p < 0.001	1.1 (0.7–1.5)	p > 0.05
Satisfied	1.0		1.0	
<b><i>Alcohol intoxication</i></b>				
3 and more times	1.8 (1.4–2.4)	p < 0.001	1.3 (0.9–1.8)	p > 0.05
1 or 2 times	1.3 (1.0–1.8)	p < 0.05	1.1 (0.8–1.6)	p > 0.05
No	1.0		1.0	
<b><i>Current smoking</i></b>				
Yes	1.9 (1.6–2.4)	p < 0.001	1.3 (1.0–1.7)	p < 0.05
No	1.0		1.0	
<b><i>Drug use</i></b>				
Yes	2.2 (1.7–2.7)	p < 0.001	1.4 (1.1–1.9)	p < 0.05
No	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied individual factors.

Table 3.11

**Multi-variate logistic regression models for association between adolescent suicidal ideation and individual factors in girls**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Level of depressive symptoms</i></b>				
High	5.1 (4.0–6.4)	$p < 0.001$	3.0 (2.4–3.9)	$p < 0.001$
Moderately high	2.1 (1.7–2.7)	$p < 0.001$	1.7 (1.3–2.2)	$p < 0.001$
Low	1.0		1.0	
<b><i>Level of self-esteem</i></b>				
Low	3.7 (3.0–4.5)	$p < 0.001$	2.3 (1.8–2.9)	$p < 0.001$
Moderately low	1.7 (1.4–2.2)	$p < 0.001$	1.4 (1.1–1.7)	$p < 0.05$
High	1.0		1.0	
<b><i>Satisfaction with own health</i></b>				
Dissatisfied	3.5 (2.8–4.5)	$p < 0.001$	2.1 (1.6–2.8)	$p < 0.001$
Moderately satisfied	2.1 (1.7–2.6)	$p < 0.001$	1.5 (1.2–1.9)	$p < 0.05$
Satisfied	1.0		1.0	
<b><i>Alcohol intoxication</i></b>				
3 and more times	2.9 (2.3–3.6)	$p < 0.001$	1.8 (1.4–2.4)	$p < 0.001$
1 or 2 times	1.7 (1.4–2.1)	$p < 0.001$	1.3 (1.0–1.7)	$p < 0.05$
No	1.0		1.0	
<b><i>Current smoking</i></b>				
Yes	2.1 (1.8–2.6)	$p < 0.001$	1.4 (1.2–1.8)	$p < 0.05$
No	1.0		1.0	
<b><i>Drug use</i></b>				
Yes	2.1 (1.8–2.6)	$p < 0.001$	1.4 (1.1–1.7)	$p < 0.05$
No	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied individual factors.

Table 3.12

**Multi-variate logistic regression models for association between adolescent suicide attempts and individual factors in boys**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Level of depressive symptoms</i></b>				
High	6.8 (4.7–9.9)	p < 0.001	3.5 (2.3–5.5)	p < 0.001
Moderately high	2.4 (1.7–3.5)	p < 0.001	2.0 (1.3–3.0)	p < 0.05
Low	1.0		1.0	
<b><i>Level of self-esteem</i></b>				
Low	8.0 (5.2–2.1)	p < 0.001	5.1 (3.2–8.2)	p < 0.001
Moderately low	2.9 (1.8–4.6)	p < 0.001	2.4 (1.4–4.0)	p < 0.05
High	1.0		1.0	
<b><i>Satisfaction with own health</i></b>				
Dissatisfied	4.6 (2.9–7.1)	p < 0.001	2.1 (1.3–3.6)	p < 0.05
Moderately satisfied	2.6 (1.7–4.0)	p < 0.001	1.3 (0.8–2.1)	p > 0.05
Satisfied	1.0		1.0	
<b><i>Alcohol intoxication</i></b>				
3 and more times	2.0 (1.4–2.8)	p < 0.001	1.0 (0.7–1.6)	p > 0.05
1 or 2 times	1.2 (0.8–1.7)	p > 0.05	0.8 (0.5–1.3)	p > 0.05
No	1.0		1.0	
<b><i>Current smoking</i></b>				
Yes	2.8 (2.1–3.8)	p < 0.001	2.3 (1.6–3.2)	p < 0.001
No	1.0		1.0	
<b><i>Drug use</i></b>				
Yes	3.0 (2.3–4.1)	p < 0.001	1.7 (1.2–2.4)	p < 0.05
No	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied individual factors.

Table 3.13

**Multi-variate logistic regression models for association between adolescent suicide attempts and individual factors in girls**

Factor	Model 1*		Model 2**	
	OR (95 % TI)	p	OR (95 % TI)	p
<b><i>Level of depressive symptoms</i></b>				
High	4.8 (3.5–6.5)	$p < 0.001$	2.8 (2.0–3.9)	$p < 0.001$
Moderately high	2.1 (1.5–3.0)	$p < 0.001$	1.7 (1.2–2.4)	$p < 0.05$
Low	1.0		1.0	
<b><i>Level of self-esteem</i></b>				
Low	3.7 (2.8–4.8)	$p < 0.001$	2.3 (1.7–3.1)	$p < 0.001$
Moderately low	2.0 (1.5–2.7)	$p < 0.001$	1.6 (1.1–2.1)	$p < 0.05$
High	1.0		1.0	
<b><i>Satisfaction with own health</i></b>				
Dissatisfied	3.5 (2.6–4.6)	$p < 0.001$	2.1 (1.5–2.9)	$p < 0.001$
Moderately satisfied	1.8 (1.4–2.5)	$p < 0.001$	1.3 (0.9–1.7)	$p > 0.05$
Satisfied	1.0		1.0	
<b><i>Alcohol intoxication</i></b>				
3 and more times	2.9 (2.2–3.9)	$p < 0.001$	1.8 (1.3–2.5)	$p < 0.001$
1 or 2 times	2.3 (1.7–3.1)	$p < 0.001$	1.8 (1.4–2.5)	$p < 0.001$
No	1.0		1.0	
<b><i>Current smoking</i></b>				
Yes	2.5 (2.0–3.2)	$p < 0.001$	1.8 (1.4–2.3)	$p < 0.001$
No	1.0		1.0	
<b><i>Drug use</i></b>				
Yes	2.1 (1.7–2.6)	$p < 0.001$	1.2 (0.9–1.6)	$p > 0.05$
No	1.0		1.0	

\* Adjusted for the respondent's age and material status of the family.

\*\* Adjusted for the respondent's age, material status of the family and studied individual factors.

## **4. DISCUSSION**

### **4.1. Prevalence of suicidal behaviour among socio-demographic groups of adolescents in Latvia**

The results of the Thesis show that 15.7 % of adolescents in Latvia aged 14 to 17 (11.7 % boys and 19.4 % girls) have thought about a specific method, place or action to commit a suicide (reported suicidal ideation during lifetime). Taking into account differences in the definition of suicidal ideation in scientific literature and the fact that the definition to determine suicidal ideation in the Thesis was constructed for the determination of active suicidal ideation, it is difficult to accurately compare prevalence of suicidal ideation with the results obtained in other countries. Quite similar prevalence figures – 14.6 % in the relevant age group (9.2 % for boys and 20.3 % for girls) was obtained in a study carried out in Belgium, England, Hungary, Ireland, the Netherlands, Norway and Australia; however, prevalence figures from this study represents self-harm thoughts, without clear distinction between suicidal and non-suicidal self-harm (Madge et al., 2011). On the other hand, as it is in human (especially adolescent) nature and particularly in the case of self-harm, suicidal intent may be ambivalent and a clear intent to live or die may not be distinguished (WHO, 2014a), which means that these figures to some degree may be used for comparison, since it is unlikely that an adolescent when answering the question has taken into account the assumptions of researchers and scientists on differences between definitions of concepts and has analysed in detail intent to die. Although prevalence of suicidal ideation in the Thesis is significantly lower than in a study in 17 European countries, where respondents were asked whether they have ever thought of harming themselves and the obtained prevalence was almost twice as high – 30.8 % (20.2 % in boys and 41.2 % in girls) (Kokkevi et al., 2012), most likely because of the comparative accuracy

of the definition used in this Thesis, which can be considered a comparative advantage of the definition used in thesis.

Meanwhile, 8.2 % (5.9 % boys and 10.2 % girls) of the 14 to 17-year-old adolescents analysed in the study, reported having attempted suicide during their lifetime. In relation to suicide attempts differences in definitions in scientific literature are not as significant as in the case of suicidal ideation, and it is therefore easier to compare various studies. As regards suicide attempts, the most significant variations in prevalence figures are observed in studies depending on the method of data collection – research data show that adolescents are more likely to report suicide attempts in anonymous questionnaires compared to direct interviews (Safer, 1997), which suggests that adolescents are more likely to open up about such experiences in anonymous questionnaires. Accordingly, the prevalence of adolescent self-reported suicide attempts in the analysed scientific literature varies depending on the research methodology used and the age group of the adolescents analysed – from 2.9 % to 14.4 % in total prevalence, 1.5 % to 8.4 % for boys and 2.5 % to 17.9 % for girls (Kokkevi et al., 2012; Kokkevi et al., 2011; Nock et al., 2013; Joe et al., 2009; Hu et al., 2015; Zarrouq et al., 2015). The most accurate comparison of prevalence figures of adolescent self-reported suicide attempts with other countries is possible by analysing data from countries where ESPAD study with an integrated psychosocial module has also been conducted, including the question about suicide attempt. Although data on adolescents aged 15–16 are compared, data for 2007 show that in these 17 countries the average prevalence of suicide attempts was 11 % (8 % for boys and 14 % for girls) (Hibell et al., 2009) and the median is 10.5 % (6.9 % for boys and 13.7 % for girls) (Kokkevi et al., 2012), which shows that both the overall prevalence and prevalence in gender groups in Latvia, in 2011 was relatively lower; however, given that these figures tend to change in the course of time (Kokkevi et al., 2011), data

from 2011 would be necessary for a more accurate comparison between countries.

An important issue is also the interpretation of suicide attempt, especially among adolescents. Despite the fact that in many other studies a similar question is asked to identify suicide attempts, on the one hand, specifying the question would reduce interpretations; however, explicit descriptions (e.g. method) may be provoked to engage in imitative behaviours (WHO, 2008), particularly in adolescent population and when large samples of adolescents are covered.

Data from the Thesis show that girls are more likely to report suicidal ideation and suicide attempts than boys, this fact is evident also in nearly all sources of scientific literature analysed. Logical is the question about reasons of these differences, especially if boys are more likely to commit completed suicides from year to year (Šica, Pulmanis and Taube, 2017). In scientific literature, this situation is described as a “gender paradox” (Tsirigotis, Gruszczynski and Tsirigotis, 2011; Rhodes et al., 2014; Beautrais, 2002), and explained by the more pronounced vulnerability of women in the cases of psychopathology and psychosocial stressors (Vijayakumar, 2015), which are more common among women and girls despite the fact that women choose less lethal suicide methods, that attract more attention to psycho-emotional suffering of a woman and are less associated with a real intention to die. Other explanations are related to the willingness of females to discuss and seek help for emotional problems, such as visiting a doctor, calling a crisis helpline etc. (Beautrais, 2002).

It was also found in the results of the Thesis that higher prevalence of suicidal ideation is in the older age group of adolescents – 16 to 17 age group compared to 14 to 15 age group. The trend of higher prevalence of suicidal ideation and suicide attempts among older adolescents has also been observed

in other studies (Zubrick et al., 2016; Wolitzky-Taylor et al., 2010) (differences in the prevalence of suicide attempts in age groups were not statistically significant in the Thesis), but it should be noted that lifetime prevalence of suicidal behaviour could also be theoretically influenced by the length of life of the adolescent, which, despite the relatively small range of age group, does not allow complete conclusions to be drawn on differences in prevalence of suicidal behaviour among the analysed age groups.

The results of the Thesis show that a higher prevalence of suicidal ideation is also observed among boys and girls who have assessed the material status of their family as low, and girls in this assessment category of material status also have a higher prevalence of self-reported suicide attempts. Overall, the results are consistent with the findings in foreign studies (Samm et al., 2010; Zubrick et al., 2016; Kokkevi et al., 2012); however, in 2011 when the survey was conducted, Latvian families still experienced the consequences of the 2008–2010 financial and administrative crisis in Latvia. In this case, an advantage of the study may be the fact that the assessment of one's material status of the family was subjective and not objective, which also represents the personal experience of the socio-economic situation (Singh-Manoux, Adler and Marmot, 2003) resulting from a comparison of the material status of one's own family with other families in the particular community (living environment). Taking into account the many aspects of material status, it would be useful to analyse how close the association between suicidal behaviour and low material status of the family is right now – several years after the Latvian financial and administrative crisis.

It was also found in the Thesis that 66.5 % of the respondents who reported lifetime suicide attempts also reported suicidal ideation, while 34.4 % of the respondents who reported lifetime suicidal ideation also reported suicide attempts. The results suggest that a part of suicide attempts among adolescents



may occur spontaneously, without long term consideration of intentions. Data from the study in 17 European countries on adolescents aged 15 to 16 showed that 80.9–93.9 % of the respondents (depending on the country) who reported lifetime suicide attempt, also reported self harm thoughts, while an average third of respondents who reported self harm thoughts, also reported suicide attempt (Kokkevi et al., 2012).

## **4.2. Suicidal behaviour and factors related to family environment**

The results of the Doctoral Thesis show that not living with both biological parents increases both the odds for suicidal ideation and suicide attempts. Results are consistent with other studies (Zaborskis, Sirvyte and Zemaitiene, 2016; Laukkanen et al., 2009; Nock et al., 2013; Kokkevi et al., 2012; Kokkevi et al., 2011; Morey et al., 2008; Wagner, Cole and Schwartzman, 1995; Ponnet et al., 2005). Only in girls after adjusting to age, material status of the family and other studied family environment related factors association with suicidal ideation was no longer statistically significant. Research has shown that association can be influenced by the quality of the parent-child relationship, financial situation in single-parent families, and the amount of love received in the family, which might be more important than the structure of the family (Susukida, Wilcox and Mendelson, 2016; Turunen, 2013); however, adjusting by financial situation of family in both gender groups showed minimal impact, and after adjusting to other factors associated with the family environment (including emotional support from parents), the association was no longer statistically significant only in girls, only in relation to suicidal ideation, so it can be suggested that there could be a number of other “mechanisms” worth researching in the future that increase the odds for suicidal behaviour in adolescents who do not live with both biological parents, such as lack of security and sense of belonging, which may provoke risk

behaviour (Brooks et al., 2012). The results highlight the need for policy-level solutions that provide financial and other support to families, so parents are not obliged to leave the country, for example, for financial reasons.

The results show that the odds for both types of suicidal behaviour studied in both genders are increased by a lack of emotional support from parents; the odds for suicidal behaviour are higher in adolescents who receive emotional support from parents rarely/never as well as in those who receive emotional support sometimes (the association between the category “sometimes” and suicide attempts in boys is an exception). In addition, this association with the two types of suicidal behaviour studied remains statistically significant even after adjusting for age, family status and other studied family-related factors. The findings suggest that the emotional support available from parents at the right time can play an important role in preventing suicidal behaviour and that there may be significant negative consequences if such support is not available. Similar results have also been obtained from studies in other countries (Zaborskis, Sirvyte and Zemaitiene, 2016; Mark et al., 2013; Brunner et al., 2014). The results suggest that, in addition to promoting the awareness of the importance of providing emotional support to the child, other support systems (supportive relationships among peers, support from psychologists and educators at school, crisis helplines, etc.) are especially important when emotional support from parents is not available.

In both gender groups, the odds for both suicidal ideation and suicide attempts are found to be higher in adolescents with suicidal experience in the family, or in other words in families where any of the family members has committed or attempted suicide. Moreover, the effect of this factor on the odds for suicidal behaviour is significant. The association between suicidal experiences in the family and suicidal behaviour is also consistent with other studies (Tomori et al., 2001; Portzky, De Wilde and van Heeringen, 2008;

Nanayakkara et al., 2013; Brent and Mann, 2006; Chan et al., 2018; Cerel and Roberts, 2005). The explanation of the association observed could be based on the Social Learning Theory, which stresses that new types of behaviour are acquired (learned) through direct experience or by observing the actions of others (Bandura, 1971) – such hypothesis is also expressed in another study (Chan et al., 2018). In recent years, some of the above-mentioned associations in the scientific literature are also explained by genetic factors that can “transfer” suicidality both directly and through impulsive aggressive behaviour and mood disorders that can accordingly provoke suicidal behaviour (Turecki and Brent, 2016). Despite the explanations of the association, the findings show that adolescents with suicidal experience in the family are a high risk group for suicidal behaviour with respectively higher risk for completed suicide, which should be taken into account in prevention programmes, as well as when developing screening “tools” that differentiate adolescents in high-risk groups for further intervention.

The results of the Thesis show that the odds for suicidal behaviour in both gender groups is also increased by physical domestic violence and the association remains statistically significant even after adjusting for age, material status of the family and other factors studied related to family environment, despite the fact that the affirmative response to the question “I was involved in physical violence in my home, involving an adult” does not allow to determine the exact nature of the involvement, namely whether the violence was directed against the adolescent or whether, for example, the adolescent was a witness of physical violence. The answer of adolescent in this question rather highlights the fact that a teenager comes from a family environment in which physical violence occurs, which may also be associated with a risk of suicidal behaviour. Physical violence against an adolescent was found to be a risk factor for suicidal behaviour also in other studies (Waldrop et

al., 2007; Guo et al., 2018); however, the relationship with the status of a witness was not confirmed in various studies (Turner et al., 2012; Isohookana et al., 2013), which indicates that a more precise definition of physical violence would allow more accurate comparisons and avoid interpretations.

In terms of sexual harassment, there is a slightly different situation compared to other factors related to family environment, namely, based on the calculation of odds ratio, the odds for suicidal ideation in boys who have experienced sexual harassment in family are even 10.7 times higher and 16 times higher for suicide attempt. After adjusting for the age of respondent and material status of the family, the odds ratio changes minimally; however, after adjusting with other studied family related factors, although in both genders the odds for suicidal behaviour in the case of sexual harassment are higher, they are statistically significantly higher only for suicide attempts in boys. This can be explained by two factors. Firstly, the question in the survey does not allow the interpretation of the sexual harassment among adolescents, the frequency of harassment or whether it resulted in, for example, a more severe type of sexual harassment – intercourse, which limits the the ability to assess the association in higher risk groups. Secondly, only 3.2 % (n = 111) of boys and 1.2 % (n = 46) of girls have reported sexual harassment in family, which significantly limits the statistical power to establish association after adjusting for with other family-related factors studied. Taking into account the high odds for suicidal behaviour in the case of sexual harassment in univariate analysis and after adjusting with the age of the respondents and material status of the family, higher odds (although not statistically significant) after adjusting with other factors associated with the family environment, as well as the association between sexual harassment and suicidal behaviour found in various other studies (Waldrop et al., 2017; Martin et al., 2004; Isohookana et al., 2013; Guo et al., 2018), before conducting a study with larger adolescent population

sample, it is not possible to clearly conclude that there is no increased risk for suicidal behaviour in groups where the association was not statistically significant. Accordingly, it would be advisable to conduct an in-depth study of this association in the future, using a larger population sample, and to use more accurate definitions of physical and sexual violence, while respecting the ethics of research and providing psychological support in order to avoid emotional suffering of a child when recalling or realising episodes of sexual abuse.

### **4.3. Suicidal behaviour and factors related to peer environment**

In assessing the results of the Thesis in relation to association between suicidal ideation among adolescents and lack of emotional support from peers, it should be concluded that girls who receive emotional support from peers rarely/never or sometimes have higher odds for suicidal ideation; however, in boys the association is statistically significant only for rarely/never category and loses statistical significance after adjusting for other factors studied related to peer environment. Similarly, there was no statistically significant association in boys between suicide attempts and lack of emotional support from peers before or after adjusting with other factors, while in girls who received emotional support from peers rarely/never this association was confirmed. The results suggest that lack of peer emotional support leads to more pronounced negative psycho-emotional consequences in girls.

Also, association between suicidal behaviour and lack of emotional support in the family was more significant and persistent than from peers, which suggests that, despite the fact that the factors associated with family and peer environment were analysed in separate regression models, lack of emotional support from family seems to cause more severe negative psycho-emotional consequences when compared to lack of emotional support from peers.

In both gender groups the odds for suicidal ideation and suicide attempt are increased by suicidal experience among peers, and the effect of this factor on the odds of suicidal behaviour is the most significant among factors studied in relation to peer environment, both before and after adjusting. Here also one of the explanations of such association may be based on the theory of Social Learning, which emphasises that new behaviour is acquired (learned) through direct experience or by observing the actions of others (Bandura, 1971). Similarly, adolescents may be more inclined to engage with different groups of adolescents in which risk of suicidal behaviour may be higher (Briggs, Slater and Bowley, 2017). Undeniably, loss (in the event of a completed suicide) can lead to emotional distress and long-term inability to cope with what has happened, which can be in turn associated with suicidal behaviour of an adolescent. The results on the association between suicidal experience among peers and suicidal behaviour in adolescents are consistent with other studies (Bearman and Moody, 2004; Ho et al., 2000; Nanayakkara et al., 2013). It should be concluded that adolescents who have experienced suicide among peers, and adolescents with suicidal experience in family, are a significant risk group for suicidal behaviour with respectively higher risk for completed suicide, which should be taken into account in prevention programmes, as well as when developing screening tools that differentiate adolescents in high-risk groups for further intervention.

The results of the Thesis show that the odds for both suicidal ideation and suicidal attempts in both gender groups are increased by bullying at school, and this association remains statistically significant and pronounced even after adjusting for the respondent's age, material status of family and other factors related to peer environment. The important effect of the factor is also highlighted by the fact that adolescents who experienced bullying at school only sometimes had increased odds for suicidal ideation by 1.5 to 1.6 times and

by 1.7 times for suicide attempt, compared to respondents who were not bullied at school. It should be noted that the question used in the Doctoral Thesis for assessing bullying reflects only the fact and frequency of verbal bullying, but it is impossible to determine whether adolescents have been subjected to other forms of bullying (for example, physical bullying, exclusion from peer group, cyberbullying), or whether verbal bullying occurred due to inequality of strength between the victim and the abuser(s), which might increase the effect of this factor on suicidal behaviour (Olweus, 1994); however, given that the victim may often be exposed to multiple forms of bullying at the same time (Wang et al., 2010), it is very likely that a part of verbal bullying victims also experience other forms of bullying. Interestingly, contrary to the results obtained in the Doctoral Thesis, in some studies in other countries the association between verbal bullying and suicidal behaviour was not confirmed (Brunstein Klomek et al., 2019; Bazilay et al., 2017), but the results of several other studies also confirm the association between verbal bullying and suicidal behaviour (Ford et al., 2017; Alavi et al., 2017). The results of the Thesis regarding association between the status of the victim of bullying and suicidal behaviour, together with high prevalence of bullying among Latvian adolescents (WHO, 2016), highlight the need for an inter-sectoral multi-disciplinary programme to prevent bullying in Latvian schools, which would promote psycho-emotional well-being among adolescents and also contribute to prevention of suicidal behaviour and, accordingly, suicide prevention.

#### **4.4. Suicidal behaviour and individual factors**

The results of the Thesis show that both high and moderately high level of depressive symptoms significantly increase the odds of both types of suicidal behaviour studied in both gender groups. The association between both completed suicide and suicidal behaviour, and depression has been confirmed

in studies on both adult and adolescent populations (Gustafsson and Jacobsson, 2000; Lesage et al., 1994; Hirokawa et al., 2012; Nock et al., 2013; Zubrick et al., 2017), but there are fewer studies that analyse association with increased levels of depressive symptoms, particularly among adolescents, and more particularly in Latvia. The importance of this association lies in the fact that the number of adolescents with depressive symptoms who do not reach the diagnostic criteria for clinically significant depression is high (Cuijpers et al., 2006), and according to the results of the Thesis, these adolescents are also a risk group for suicidal behaviour, in addition the odds for suicidal behaviour were 1.7 to 2.0 times higher for adolescents with moderately high level of depressive symptoms as well. The CES-D scale used in the Thesis is recommended for the assessment of the level of depressive symptoms in adolescent population (Stockings et al., 2015), but it should be noted that one of the limitations is the fact that the questions asked to determine the level of depressive symptoms refer to the period of last seven days, whereas the questions for the assessment of suicidal behaviour refer to lifetime prevalence of suicidal behaviour. Despite this limitation, the observed association between the level of depressive symptoms and suicidal behaviour is significant. It is very likely that factors that cause depressive symptoms affect adolescents over a long period of time, and an increased level of depressive symptoms may be the result of long term impact of those factors. Despite the above, the results obtained in the Thesis show that assessment of the level of depressive symptoms among 14 to 17-year-old adolescents in Latvia is important and recommended for identifying risk for suicidal behaviour.

The results of the Thesis show that low and moderately low levels of self-esteem also significantly increase the odds for both types of suicidal behaviour in both gender groups. Self-esteem determines an individual's confidence in one's suitability for life and life requirements, confidence in



ability to think, overcome life's problems, belief in the right to be happy, feeling of being valued, with the rights to protect one's needs and desires and enjoy the results of one's efforts. Self-esteem is an integral part of normal and healthy development of an individual (Branden, 1990). Even after adjusting for the level of depressive symptoms and other individual factors, there is a statistically significant association among Latvian adolescents not only between suicidal behaviour and low self-esteem, but also between suicidal behaviour and moderately low level of self-esteem – while in some other foreign studies after adjusting with depression, statistically significant association remained only with individual self-esteem forming elements or in a separate gender group (Wang et al., 2003; Wild, Flisher and Lombard, 2004); however, the overall association found in this Thesis is consistent with findings in studies conducted abroad (Overholser et al., 1995; Lakey et al., 2014; O'Connor, Rasmussen and Hawton, 2009; Bridge, Goldstein and Brent, 2006; Tatnell et al., 2014). The results of the Thesis show that interventions aimed at raising the level of self-esteem of adolescents also play an important role in suicide prevention programmes. The development, approbation and implementation of such interventions could be complex and based on cooperation of many specialists, but it is clear that it would increase psycho-emotional well-being of adolescents, ability to overcome psycho-emotional challenges and reduce suicidal behaviour, while also serving as an important element in prevention of completed suicides.

Evaluating the results obtained in the Thesis regarding association between suicidal behaviour among adolescents and satisfaction with own health, it should be concluded that girls who are dissatisfied with their health or are moderately satisfied have higher odds for suicidal ideation both before and after adjusting with other individual factors studied, but for boys, after adjusting with other individual factors studied, the association was no longer

statistically significant. Quite similar results regarding the association with suicidal ideation in gender groups were also found in a study in the US (Nkansah-Amankra, Walker, and Clark, 2009). Another study notes that girls tend to evaluate their health lower even after adjusting with lifestyle factors and psychological variables (Vingilis, Wade and Seeley, 2002), which may suggest that girls may be more sensitive to their health problems and judge them more critically than boys. However, among Latvian adolescents, also association between dissatisfaction with health and suicide attempts was confirmed in both gender groups, both before and after adjusting with other individual factors studied, which indicates that both boys and girls are in risk group for suicide attempts regarding dissatisfaction with health. In general, the association between poor health self-assessment and suicidal behaviour has also been confirmed in a study conducted in South Korea (Kang et al., 2015), but in a study carried out in Peru, after adjusting the association was no longer statistically significant (Sharma et al., 2015).

In the analysis of the results of the Thesis, it should be concluded that regarding association between adolescent suicidal behaviour and alcohol intoxication during lifetime, girls who were intoxicated 3 and more times or 1 to 2 times in life had higher odds for both suicidal behaviours studied both before and after adjusting for other individual factors, while the association between suicidal behaviour and both categories of alcohol intoxication were no longer statistically significant in boys after adjusting for other individual factors studied, and furthermore, the association with the lowest risk category of harmful use of alcohol in boys was not statistically significant already in univariate analysis. Studies have shown that adolescents with addictive substance abuse problems often experience negative stressful events, interpersonal problems, reduced social support, loneliness and helplessness (Pompili et al., 2012) as well as depression (Bond et al., 2005). Taking into

account that the factor in the Thesis was also adjusted for the level of depressive symptoms and self-esteem, it is likely that these two factors in boys may explain the association that appears in the odds ratio, but in girls the correlation might be affected by other “mechanisms”. A number of motivation patterns for risky use of alcohol in adolescents are reported in literature – hedonic motivation when alcohol is used to elevate mood; conformist motivation where alcohol is used to avoid social rejection; motivation of socialisation is drinking to fit in a group; problem-solving motivation is associated with alcohol use with intention to reduce unpleasant emotions and feelings, and suicidal behaviour is most closely associated with the problem-solving motivation (Kokroļeva et al., 2008). Perhaps differences in the association with suicidal behaviour in gender groups are linked to differences in motivation of alcohol intoxication in gender groups, which, however, requires further research. The definition used in the Thesis for assessing alcohol intoxication should be seen as an advantage since it can relatively accurately establish the fact of intoxication. In general, the results of the Thesis on correlation with suicidal behaviour are consistent with the findings of most foreign studies (Wu et al., 2004; Kokkevi et al., 2012; Peltzer and Pengpid, 2015; Wang and Yen, 2017), but emphasis in these studies was on frequency of alcohol use and not alcohol intoxication.

The results of the Thesis show that odds for suicidal ideation in both gender groups are also increased by current smoking. This association has also been confirmed in many other studies in both adult and adolescent populations (Poorolajal and Darvishi, 2016; Wu et al., 2004; Kokkevi et al., 2012), but there is still lack of consensus among scientists about causes of this association – it was noted in a major meta-analysis discussion that it is still unclear whether smoking affects suicidal behaviour through biological mechanisms associated with smoking itself or whether this correlation can be explained by collinearity

between smoking and other factors related to suicidal behaviour, such as psychosocial risk factors or various other risk behaviours. It was also mentioned that smoking tends to be part of problematic behaviour which is associated with mental disorders, drug and alcohol use, and sexual and physical violence, which are considered to be important causes of suicide and suicidal behaviour (Poorolajal and Darvishi, 2016). In this case as the advantage of the thesis can be mentioned the fact that current smoking in the logic regression model was adjusted for the level of depressive symptoms, self-esteem, alcohol intoxication, drug use, and even after adjusting the odds for suicidal behaviour decreased, the association was still statistically significant.

The results have shown that the use of drugs (marijuana/hashish, amphetamine, LSD/other hallucinogenic, crack, cocaine, heroin, ecstasy or spice) during lifetime also increase the odds for suicidal behaviour. In relation to suicidal ideation, the association with drug use is statistically significant in both gender groups, but in relation of suicide attempts in girls, after adjusting for other individual factors, the association was no longer statistically significant. There are also various explanations of this association in scientific literature, for example, in a study in Taiwan it is stated that acute drug intoxication may affect judgement and reduce the ability to control impulsiveness, while chronic intoxication can negatively affect brain development and change behaviour and processes governing aggression and impulsiveness (Wang and Yen, 2017). In general, correlation between drug use and suicidal behaviour is consistent with other studies (Wang and Yen, 2017; Kokkevi et al., 2012; Wu et al., 2004), which suggests that drug use is also one of the factors that differentiates adolescents with higher risk of suicidal behaviour, which needs to be taken into account when planning and implementing interventions for suicidal behaviour and suicide prevention.

## 4.5. Other observations

Taking into account the facts mentioned above, it can be concluded that the hypothesis that there is an association in both gender groups between adolescents' self-reported suicidal ideation and all studied family environment related, peer environment related and individual factors, has been confirmed partially.

The second hypothesis that there is an association in both gender groups between adolescents' self-reported suicide attempts and all studied family environment related, peer environment related and individual factors, has also been confirmed partially.

It should also be noted that cross-sectional design of the study does not allow assessment of the cause-and-effect relationship in time. Similarly, the results of the study may be influenced by a systematic recall bias, particularly regarding the variables calculated based on adolescent responses about entire lifetime, therefore, memory deviation may affect association between suicidal behaviour and factors studied.

Considering different circumstances, including absence and refusal to participate in the survey, the calculated level of non-responsiveness in schools and classes that agreed to participate in the study was 15.3 % of all pupils (Trapencieris et al., 2012). Given that there may be differences in prevalence of suicidal behaviour and various types of risk factors in this adolescent group, further studies on prevalence of suicidal behaviour and associated risk factors among adolescents who miss or do not attend school should be carried out in the future to obtain complete information.

Analysis carried out within the framework of the Thesis is the only analysis in Latvia of such kind and level of detail analysing factors related to suicidal behaviour of adolescents in the respective age group, and this analysis provides not only theoretical, but also significant practical contributions in

differentiating risk groups, developing public health policies, and implementing interventions for preventing suicidal behaviour and suicides.

## 5. CONCLUSIONS

1. Significant proportion – 15.7 % of Latvian adolescents aged 14 to 17 have thought about a specific method, place or action to commit a suicide – every tenth boy (11.7 %) and almost every fifth girl (19.4 %).
2. Significant proportion – 8.2 % of Latvian adolescents aged 14 to 17 have reported lifetime suicide attempt – 5.9 % boys and 10.2 % girls.
3. Prevalence of both types of suicidal behaviour studied is higher among girls.
4. Prevalence of suicidal ideation is higher among adolescents who evaluate material status of their families as low compared to other families in Latvia, while in girls from families with low material status also the prevalence of suicide attempts is higher.
5. Factors related to family environment that independently increase the odds for suicidal ideation in both gender groups are suicidal experience in the family, domestic physical violence, rarely/never and sometimes experienced emotional support from parents, but separately for boys - not living with both biological parents.
6. Factors related to family environment that independently increase the odds for suicide attempt in both gender groups are suicidal experience in the family, domestic physical violence, rarely/never experienced emotional support from parents and not living with both biological parents, but separately for boys – sexual harassment in the family and separately for girls – sometimes experienced emotional support from parents.
7. Factors related to peer environment that independently increase the odds for suicidal ideation in both gender groups are suicidal experience among peers, always/often and sometimes experienced bullying at school, but

separately for girls – rarely/never and sometimes experienced emotional support from peers.

8. Factors related to peer environment that independently increase the odds for suicide attempt in both gender groups are suicidal experience among peers, always/often and sometimes experienced bullying at school, but separately for girls – rarely/never experienced peer emotional support.
9. Individual factors that independently increase the odds for suicidal ideation in both gender groups are high and moderately high level of depressive symptoms, low and moderately low level of self-esteem, lifetime drug use and current smoking, but separately for girls – dissatisfaction and moderate satisfaction with own health and lifetime alcohol intoxication.
10. Individual factors that independently increase the odds for suicide attempt in both gender groups are high and moderately high level of depressive symptoms, low and moderately low level of self-esteem, current smoking and dissatisfaction with own health, but separately for girls – alcohol intoxication in lifetime and separately for boys – lifetime drug use.



## **6. PRACTICAL RECOMMENDATIONS**

1. The results of the Thesis show that among adolescents a significant association exists between suicidal behaviour and studied factors related to the environment of the family, the environment of peers, and individual factors, and these groups of studied factors should be taken into account by professionals working with adolescents in daily practice (family doctors, psychologists, psychotherapists, psychiatrists, teachers, etc.) for identifying potential risks, and by policy makers of public health, welfare and other relevant sectors for planning of interventions for successful prevention of suicidal behaviour and suicide, focusing on building psychologically supportive and violence-free family and peer environments, increasing self-esteem of adolescents, treating and preventing depression, promoting general health, and preventing of the use of addictive substances.
2. In Latvia, as in other EU countries, it is necessary to develop and approve separate, specific strategy for promoting public mental health and prevent suicide, including specific activities for prevention of suicidal behaviour and suicide among adolescents. The importance of the problem in the context of the high suicide rates in Latvia has already been highlighted in the Public Health Guidelines and the conclusions of the Thesis provide evidence-based information for the implementation of inter-sectoral (health, welfare, education, etc.) cooperation-based prevention interventions in adolescent population and in risk groups.
3. Based on the results obtained in the Thesis, national expert groups can decide to continuously incorporate the question used for assessing the prevalence of adolescence suicidal behaviour as an indicator in periodic

representative surveys of adolescent population, in order to monitor dynamics of the situation and respond accordingly.

4. Further research is needed with particular emphasis on detailed, in-depth and additional studies on the association between suicidal behaviour and various forms of domestic violence and violence among peers (physical, sexual, emotional violence; emotional neglect; bullying by exclusion from groups; cyberbullying, etc.) by selecting large sample of respondents with high statistical power in order to identify associations between factors with low prevalence (especially, sexual violence).
5. Similarly, additional significant contribution would be the study of suicidal behaviour among adolescents with different types of motivations of harmful use of alcohol, the study of the causes of association between current smoking and suicidal behaviour, study of association between the use of smoking devices and process addiction and suicidal behaviour, as well as the study of prevalence of suicidal behaviour and associated factors in adolescents who skip school.

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## PUBLICATIONS AND THESES

### Articles in international journals

1. Springe, L., **Pulmanis, T.**, Velika, B., Pudule, I., Grīnberga, D., Villeruša, A. 2016. Self-reported suicide attempts and exposure to different types of violence and neglect during childhood: Findings from a young adult population survey in Latvia. *Scandinavian Journal of Public Health*. 44, 411–417.
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### **Theses at Latvian conferences**

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