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Rīga Stradiņš University

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Prevalence and Associated Factors of Emotional and Behavioural Difficulties in Latvian Adolescent Population

Summary of the Doctoral Thesis for obtaining the scientific degree "Doctor of Science (*PhD*)"

Sector Group – Medical and Health Sciences
Sector – Clinical Medicine
Sub-Sector – Psychiatry

Riga, 2024

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Table of Contents

Abbreviations used in the Thesis

CCUH	Children's Clinical University Hospital
CDCP	Centre for Disease Control and Prevention
CFA	confirmatory factor analysis
CFI	comparative fit index
CI	confidence interval
FN	false negative
FP	false positive
HBSC	Health Behaviour in School-aged Children
ICC	intraclass correlation coefficient
LHR+	positive likelihood ratio
LHR-	negative likelihood ratio
MANOVA	multivariate analysis of variance
n	number
NPV	negative predictive value
OR	odds ratio
OR^D	diagnostic odds ratio
PPV	positive predictive value
RSU	Rīga Stradiņš University
Sen	sensitivity
SDQ	Strengths and Difficulties Questionnaire
Spe	specificity
SPSS	Statistical Package for the Social Sciences
TN	true negative
TP	true positive
WLSMV	diagonally weighted least squares

Introduction

The prevalence of mental disorders in children and adolescents is notably high, with a significant proportion experiencing mental health challenges at any given time and throughout their lifetime (Merikangas, 2009). This issue has been intensified by the Covid-19 pandemic (Ford, John, and Gunnell, 2021), placing mental disorders as the leading cause of disability among young people globally (Whiteford et al., 2015). It underscores the importance of early detection and intervention to prevent long-term adverse outcomes and societal costs.

Adolescence is a crucial period for mental and social development, making it a vital time for identifying and addressing mental health issues. However, comprehensive data on mental disorders is scarce (Erskine et al., 2017), particularly in small national states like Latvia, where officially reported prevalence rates appear lower than the European average (Skrule, Štāle, and Rožkalne, 2022) likely due to limited research and availability of epidemiological data. This data gap hinders the development of effective public health policies and services aimed at improving adolescent's mental health.

Latvia's "Public Health Policy 2021–2027" highlights mental health as a priority (LR Ministru Kabinets, 2022), yet the lack of detailed epidemiological data and understanding of risk factors specific to the Latvian population delays progress in mental healthcare for children and adolescents. Additionally, the absence of validated screening tools in Latvia limits the capacity for early detection and intervention, emphasising the need for such instruments to support comprehensive mental health strategies.

Aim of the Thesis

The aim of this Thesis is to investigate the prevalence of emotional and behavioural difficulties in the Latvian adolescent population and associated socio-demographic and health-related factors, as well as to assess the suitability

of a screening instrument for the recognition of emotional and behavioural disorders in adolescents, both in the general population and clinical practice.

Tasks of the Thesis

1. To investigate the psychometric properties of the Strengths and Difficulties Questionnaire (SDQ) self-report version in Latvian general and clinical adolescent populations.
2. To determine the prevalence of emotional and behavioural difficulties and their association with a clinically diagnosed mental and behavioural disorder in a clinical population sample of Latvian adolescents.
3. To determine the prevalence of emotional and behavioural difficulties in a sample of the general Latvian adolescent population across gender and age groups.
4. To investigate the association of emotional and behavioural difficulties with individual and environmental psychosocial factors affecting health in a sample of the general adolescent population in Latvia across gender and age groups.

Hypotheses of the Thesis

H1: Adolescents from a Latvian clinical population sample with a diagnosis of a mental and behavioural disorder have higher levels of emotional (internalising) and behavioural (externalising) difficulties than adolescents from the general population.

H2: Adolescents in the Latvian general population sample exposed to adverse individual and environmental psychosocial health-related factors have higher odds of developing emotional and behavioural difficulties, and these odds vary by age and gender.

Novelty of the Thesis

This Thesis aims to address gaps in our understanding of emotional and behavioural disorders among Latvian adolescents, examining both individual and environmental influences. It introduces and assesses a mental health screening tool across a representative sample of adolescents aged 11. 13. and 15 years, allowing for detailed analysis by gender and age. The findings inform Latvian youth mental health policies and highlight the need for targeted prevention and treatment services. Internationally, it contributes to discussions on the cross-cultural validity of psychometric tools like the SDQ.

Ethical considerations

The general population study used secondary anonymised data from the Health Behaviours in School-aged Children (HBSC) Study year 2017/2018 Latvian database. The Centre for Disease Prevention and Control (CDPC) has received approval from the Medical and Biomedical Research Ethics Committee of Riga East Clinical University Hospital (No 11-A/17. 5 October 2017. Riga, Latvia).

For the clinical population study, permission was obtained from the Ethics Committee of Rīga Stradiņš University (RSU) (Decision No 85/21.12.2017. 21 December 2017. Riga, Latvia) (see Annex 1), as well as permission from the Education and Science Department of the Children's Clinical University Hospital (CCUH) to analyse the CCUH medical records.

1 Study materials and methods

To fulfil the objectives of the Thesis, the study analysed two datasets: one from a general sample of Latvian adolescents aged 11. 13. and 15 and another from a clinical sample of help-seeking adolescents aged 11 to 17. Both groups were screened using the Strengths and Difficulties Questionnaire (SDQ) developed by Robert Goodman, a globally recognised screening tool for emotional and behavioural difficulties (Goodman, 1997). Data analysis employed IBM SPSS Statistics version 26.0 and Microsoft Excel version 16.75. using descriptive statistical methods, including measures of central tendency and dispersion for ordinal data and frequency and confidence intervals for nominal data. The research adhered to a statistical significance threshold of $p < 0.05$.

1.1 Latvian general adolescent population study

1.1.1 HBSC study methodology

The 2017/2018 Health Behaviour in School-aged Children (HBSC) study in Latvia investigated the health behaviours of 11. 13. and 15-year-old students. Conducted every four years since 1982. this cross-sectional study employs a standardised questionnaire, available in Latvian and Russian for Latvia, developed by an international team (Currie et al., 2012; Inchley et al., 2018). HBSC sampling involved a multi-stage stratified cluster method, focusing on general schools and excluding special education institutions, with schools chosen randomly. The 2017/2018 study round included the Strengths and Difficulties Questionnaire (SDQ) for additional insights into emotional and behavioural difficulties. Participation was voluntary and based on passive consent, ensuring anonymity. Data processing was centralised at the University of Bergen, Norway, with stringent criteria for questionnaire inclusion to maintain quality.

1.1.2 HBSC study population

After data cleaning, the Latvian HBSC survey database included 4412 respondents, which was 74 % of the number of pupils originally included in the survey sample. 27 respondents did not provide information on their age and were therefore not included in further analyses. Thus, 4385 respondents were included in the analysis of the association of emotional and behavioural difficulties with socio-demographic and health-related factors (see Table 1.1)

Table 1.1

HBSC survey respondents by gender and age group

Age	Boys (n)	Girls (n)	Total (n)
11 years	743	791	1534
13 years	772	741	1513
15 years	656	682	1338
Total	2171	2214	4385

1.1.3 Study variables

Dependent variables

The dependent variables analysed in the Thesis were adolescents' emotional, behavioural and general mental health difficulties (as measured by the SDQ Internalising Difficulties Scale, the Externalising Difficulties Scale and the Total Difficulties Scale, respectively).

The SDQ screening results were classified into 3 groups ('normal', 'borderline' and 'abnormal') as described below (see Section 1.2.1). A positive screening result was considered to be an “abnormal” result (score above the population’s 90th percentile), as according to research carried out by the authors of the screening questionnaire, it is this result that selects the part of the population with the highest level of difficulties and likelihood of mental disorders (R Goodman, Renfrew, and Mullick, 2000).

Independent variables

The independent variables representing different socio-demographic and health-related factors included in the HBSC survey and analysed in this Thesis in connection with the results of the SDQ screening are presented in Table 1.2. For the purpose of the analysis, all variables have been dichotomised.

Table 1.2

Independent socio-demographic and health-related variables

Associated factors	Categories	n	%	CI 95 %
Socio-demographic factors				
Family affluence	High	3193	74	72.7–75.3
	Low	1125	26	24.7–27.3
Family structure	2 parents	2747	62.3	60.9–63.7
	Other	1665	37.7	36.3–39.1
Place of residence	Other	3083	69.9	68.5–71.3
	Riga	1329	30.1	28.7–31.5
Language at home	Other	1718	38.9	37.5–40.3
	Latvian	2694	61.1	59.7–62.5
Health indicators				
Self-rated health	Good	3291	74.6	73.3–75.9
	Not good	1078	24.4	23.1–25.7
Mean life satisfaction	High	3636	82.4	81.3–83.5
	Low	701	16.2	15.1–17.3
Multiple health complaints	1 or less	3506	79.5	78.3–80.7
	2 and more	872	19.8	18.6–21.0
Health behaviour				
Sleep duration	≥7h	3488	80.7	79.5–81.9
	< 7h	833	18.9	17.7–20.1
Physical activity	High	3194	72.7	71.4–74.0
	Low	1198	27.3	26.0–28.6
Intense physical activity	High	3352	76.3	75.0–77.6
	Low	1040	23.7	22.4–25.0
Risk behaviours				
Smoking	No	3887	89.8	88.9–90.7
	Yes	441	10.2	9.3–11.1
E-cigarette use	No	3812	90.4	89.5–91.3
	Yes	405	9.6	8.7–10.5

Table 1.2 continued

Associated factors	Categories	n	%	CI 95 %
Alcohol use	No	3455	79.5	78.3–80.7
	Yes	892	20.5	19.3–21.7
Drunkenness	No	4044	92.9	92.1–93.7
	Yes	309	7.1	6.3–7.9
Marijuana use	No	1130	91.6	90.1–93.1
	Yes	103	8.4	6.9–9.9
Problematic social media use	No	3489	90.7	89.8–91.6
	Yes	359	9.3	8.4–10.2
Sexual activity	No	1067	85.9	84.0–87.8
	Yes	175	14.1	12.2–16.0
Spiritual well-being				
Relationship with others	Important	3829	90.5	89.6–91.4
	Not important	403	9.5	8.6–10.4
Relationship with self	Important	3987	93.2	92.4–94.0
	Not important	293	6.8	6.0–7.6
Relationship with nature	Important	3528	82.5	81.4–83.6
	Not important	750	17.5	16.4–18.6
Relationship with transcendent	Important	1727	41	39.5–42.5
	Not important	2487	59	57.5–60.5
Social support				
Family support	High	3832	88.5	87.5–89.5
	Low	498	11.5	10.5–12.5
Friend support	High	3677	84.6	83.5–85.7
	Low	669	15.4	14.3–16.5
Bullying				
Bullying others	Rare	3656	83.2	82.1–84.3
	Often	739	16.8	15.7–17.9
Being bullied	Rare	3456	78.7	77.5–79.9
	Often	938	21.3	20.1–22.5
E-bullying others	Rare	4127	93.9	93.2–94.6
	Often	267	6.1	5.4–6.8
Being e-bullied	Rare	4152	94.5	93.8–95.2
	Often	243	5.5	4.8–6.2
School environment				
School satisfaction	High	3265	74.5	73.2–75.8
	Low	1119	25.5	24.2–26.8
Schoolwork pressure	Low	3247	74	72.7–75.3
	High	1139	26	24.7–27.3

1.1.4 Statistical analysis of the data

The chi-square test was used to determine the proportions of the study population in sex and age subgroups, comparing the subgroup results in cross-tabulations. Confidence intervals for the proportions were calculated using the free online software *Sample Size-Net: Confidence interval for a proportion* (Kohn and Senyak, 2021).

Analytical statistical methods – odds ratio calculations – were used to determine the magnitude of the association of the independent variables with the main outcome measures (emotional, behavioural, and general mental health difficulties as measured by the SDQ). Several unadjusted, sociodemographic factor-adjusted, gender and age-stratified logistic regression models were constructed for each associated factor. Only the results of the gender-stratified logistic regression model, adjusted for other socio-demographic factors, will be presented in this summary.

1.2 Psychometric properties of the SDQ

The SDQ is a self-report screening instrument designed to assess the severity of emotional (internalising) and behavioural (externalising) difficulties in children and adolescents. The SDQ consists of 25 questions divided into 5 subscales assessing, respectively, emotional problems, behavioural problems, hyperactivity, peer problems and prosocial behaviour. The first 4 subscales are “difficulty” subscales and together constitute the “total difficulties” scale, while the prosocial behaviour subscale describes the child's “strengths” (Goodman, 1997). In later studies, an alternative variant of the analysis was proposed, namely that the “emotional problems” and “peer problems” subscales are combined to form an “internalising difficulties” scale, while the “hyperactivity” and “conduct problems” subscales are combined to form an 'externalising difficulties' scale (Goodman, Lamping, and Ploubidis, 2010).

The SDQ comes in self-report version for adolescents designed to identify emotional and behavioural difficulties between the ages of 11 and 17. The SDQ is also available as a parent-report questionnaire for children aged 2–4 years and children aged 4–17 years .

In the population sample of the dissertation research, the Latvian and Russian versions of the SDQ adolescent self-report questionnaire were used, while in the clinical sample, in addition to the Latvian version of the SDQ adolescent self-report questionnaire, the parent-report version of the SDQ 4–17 years of age was also available for analysis.

1.2.1 Distribution and interpretation of SDQ scale values

The SDQ scores each of the questions on a 3-point Likert scale (0 being "not true", 1 being "somewhat true", 2 being "certainly true"). 5 of the 20 "difficulty" questions are positively worded so that in the process of calculating the scores they had to be re-coded according to the coding algorithm developed by Goodman. The subscale and scale scores were calculated by summing the scores of the corresponding individual questions so that the 5 subscale scores could range from 0 to 10; the internalising and externalising difficulty scales from 0 to 20. and the total difficulty scale from 0 to 40. Scales and subscales with at least 1 missing value were not included in the analysis of the psychometric properties of the questionnaire.

Table 1.3

The sample size of HBSC study respondents included in the analysis of psychometric properties of SDQ scales and subscales

SDQ scales and subscales	Number of respondents included in the analysis (n)	Number of respondents excluded from the analysis (n)
Emotional problems	4192	218
Conduct problems	4191	221
Hyperactivity	4209	203
Peer problems	4191	221
Prosocial behaviour	4248	164
Total difficulties	3971	441
Internalising difficulties	4107	305
Externalising difficulties	4111	301

A positive screening result was initially defined using Goodman's thresholds based on the UK adolescent population (Goodman, 2001).

Table 1.4

SDQ thresholds based on UK adolescent population data

SDQ scales and subscales	Normal	Borderline	Abnormal
Emotional problems	0–5	6	7–10
Conduct problems	0–3	4	5–10
Hyperactivity	0–5	6	7–10
Peer problems	0–3	4–5	6–10
Prosocial behaviour	6–10	5	0–4
Total difficulties	0–15	16–19	20–40

Next, specific cut-off values for the Latvian adolescent population were calculated in the Latvian general population sample database using the Goodman algorithm, where a “normal” screening result was defined as a result below the 80th percentile of the population, a “borderline” result as a result between the 80th and 90th percentiles of the population, and an “abnormal” result as a result

above the 90th percentile of the population. The population-specific cut-offs calculated below were applied to the analysis of the SDQ adolescent self-report screening results in both the general population (see Results section 2.1.4) and the clinical population sample (see Results section 2.1.5).

1.2.2 Statistical analysis of the data

In the population study, two different language versions of the SDQ were used – Latvian and Russian, so in the context of analysing the psychometric properties of the SDQ, these two versions had to be analysed as separate psychometric instruments. All statistical analyses were performed, and the results were presented separately for the Latvian and Russian language versions of the SDQ. To describe the performance of the screening scale in the general population, the mean values of all SDQ scales and subscales were calculated and compared using multivariate analysis of variance (MANOVA) and linear regression analysis.

The internal consistency of the scales and subscales of the SDQ was assessed using Cronbach's alpha.

The factor structure of the Latvian and Russian language versions of the SDQ was evaluated by confirmatory factor analysis (CFA) using the R package Lavaan (version 0.6-11) and the model was visualised using the R package semPlot (version 1.1.5). Considering the ordinal nature of the data, the CFA optimiser was set to diagonally weighted least squares (WLSMV) as it does not make distributional assumptions about the observed variables.

Both previously hypothesised factor models were examined: the original five-factor model and the three-factor model, with Internalising, Externalising difficulties, and Prosocial behaviour scales as factors.

The recommended banding scores for the SDQ subscales were determined in quantile tables.

1.2.3 Characteristics of the study population

The Latvian adolescent population survey database included 4412 respondents. 27 respondents did not provide information on their age and were therefore not included in further analyses. 392 questionnaires came from bilingual schools, and the anonymised dataset could not identify the language of the questionnaire used at the participant level, so these questionnaires were excluded from the SDQ psychometric properties analysis part of the study. Thus, 4004 respondents were included in the SDQ psychometric properties analysis of the Thesis (see Table 1.5).

Table 1.5

Distribution of respondents to the Latvian general adolescent population survey by gender and age group according to the language of the questionnaire used

Signs	SDQ language version				Total	
	Latvian		Russian			
	n	%	n	%	n	%
Gender						
Boy	1320	49.2	667	50.5	1987	49.6
Girl	1363	50.8	654	49.5	2017	50.4
Age						
11 years	959	35.9	450	34.3	1409	35.4
13 years	913	34.2	444	33.8	1357	34.1
15 years	796	29.8	419	31.9	1215	30.5

1.3 Study in a sample of adolescent help-seeking population

The cross-sectional study in the Latvian adolescent help-seeking (clinical) population was conducted by analysing data from all outpatients aged 11–17 years who presented for a first consultation with a child psychiatrist and agreed to complete the SDQ questionnaire during one year, i.e. from November 2019 to October 2020. at the outpatient department of the CCUH Child Psychiatry Clinic.

The study aimed to assess the psychometric and predictive properties of the SDQ in a clinical population sample, as well as its suitability for recognising emotional and behavioural disorders in adolescents in clinical practice.

Before the consultation, as part of routine clinical practice, the patient and his/her legal representative completed the self-report and parent-report versions of the Latvian version of the SDQ questionnaire, respectively. SDQ screening results, as well as socio-demographic and clinical information describing the patients, were retrospectively extracted from medical records – outpatient medical charts.

The SDQ screening questionnaire was offered to all first-time outpatients of the CCUH Child Psychiatry Clinic. By definition, this sample of patients should be considered a convenience sample but given that the CCUH Child Psychiatry Clinic is the largest secondary and only tertiary-level provider of psychiatric care for all children and adolescents in Latvia, this sample can be considered to be reasonably representative of the population of young people seeking psychiatric care in the country.

The study included data from 207 adolescent patients aged between 11 and 17. The majority of patients were girls (n = 126. 60.9 %). The mean age was 13.46 (SD = 2.04) years for boys and 14.23 (SD = 1.72) years for girls. For 200 patients, adolescent self-report and parent-report questionnaire data were available in the outpatient records; for 7 patients, only adolescent self-report data were available.

In routine clinical practice, the patient's mental disorder was diagnosed by the attending physician – a board-certified child psychiatrist – based on a comprehensive clinical-psychiatric evaluation of the patient. This includes the collection of objective and subjective medical history, a psychiatric examination of the patient and the interpretation of the results of additional examinations, as well as the involvement of other members of the CCUH multiprofessional team

(e.g. clinical and health psychologists, etc.), if necessary. The clinical diagnosis of psychiatric disorders was established and documented according to ICD-10 criteria.

For further data analysis, patients were grouped into diagnostic categories of the higher taxonomic level based on their diagnoses of mental disorders, creating two groups of mental disorders – "emotional disorders" and "behavioural disorders" (Goodman et al., 2004; Robert Goodman et al., 2000; R Goodman et al., 2000).

The group of emotional (internalising) disorders included the following diagnoses of psychiatric disorders: mood disorders (ICD-10 group F3), neurotic, stress-related and somatoform disorders (F4), eating disorders (F5), emotional disorders with childhood-specific onset (F94).

The behavioural (externalising) disorders group included the following mental disorder diagnoses: hyperkinetic disorder (F90), conduct disorder (F91), mixed emotional and behavioural disorder (F92), and substance use disorder (F1).

Statistical analysis of the data

In the clinical population, the SDQ tool was evaluated for accuracy measures: sensitivity and specificity, and performance measures: positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (LHR^+), negative likelihood ratio (LHR^-) and diagnostic odds ratio (OR^D).

Sensitivity and specificity are important indicators of the accuracy of a diagnostic test, but for use in clinical practice, PPV and NPV, which reflects whether a positive or negative screening result correctly predicts the presence or absence of a clinical diagnosis, are more informative. Likelihood ratios are summary statistics (probability ratios) that show the extent to which a positive or negative screening result changes the likelihood of a patient being diagnosed with a specific disorder. OR^D is a summary indicator that shows the overall

effectiveness of a screening test. The OR^D is calculated as the ratio of the odds of a diagnosed patient being correctly identified with a positive screening result to the odds of a healthy patient being incorrectly identified with a positive screening result.

To interpret these scores, the clinical test utility criteria described by Fisher and colleagues were used, stating that for a screening test to have the potential to influence clinician decisions, it must have an $LHR^+ > 7$ and $LHR^- < 0.3$ or $OR^D > 20$ (Fischer, Bachmann, and Jaeschke, 2003).

The intraclass correlation coefficient (ICC) was determined to assess the agreement between the self-assessment and parent survey options.

2 Results

2.1 Psychometric properties of the SDQ

2.1.1 SDQ survey results

To characterise the general population of Latvian adolescents included in the HBSC study, the mean values of the SDQ questionnaire scales and subscales in gender and age groups were calculated separately for each language version of the questionnaire (Annexes 2 and 3). Comparison of the means of the SDQ questionnaire scores between genders, ages and language versions revealed significant differences in most of the groups (in all cases MANOVA p-values < 0.001). Linear regression models were constructed for each of the SDQ subscales and scales as dependent traits to estimate effect sizes for questionnaire language, respondent gender and age as independent traits. Both methods – MANOVA and linear regression – are based on a set of assumptions. According to Levene's test (p-value < 0.01), the population study data violates the assumption of homogeneity of variance. This is not unusual for large samples, as is the case for the HBSC population sample (Shatz, 2023). Absolute differences in variances between groups have been small. The results and conclusions of the less frequently used non-parametric methods were almost identical, so it was decided to report the results of the more frequently used methods. The coefficients and p-values of the models are presented in Table 2.1.

Table 2.1

Effects of language, gender and age on SDQ adolescent self-report questionnaire mean scores

SDQ scale	Language (RU v LV)		Gender (girl vs boy)		Age (11 to 13)		Age (15 to 13)	
	B	p	B	p	B	p	B	p
Emotional	−0.07	0.41	1.08	0.00**	0.22	0.03*	0.26	0.01*
Behaviour	−0.31	0.00**	−0.27	0.00**	0.13	0.07	0.01	0.88
Hyperactivity	−0.69	0.00**	−0.11	0.10	0.13	0.11	0.02	0.79
Peer	0.10	0.16	−0.20	0.00**	−0.20	0.01*	−0.06	0.49
Prosocial	0.11	0.15	0.73	0.00**	−0.27	0.00**	−0.09	0.28
Internalising	0.03	0.84	0.88	0.00**	0.01	0.94	0.21	0.16
Externalising	−1.01	0.00**	−0.39	0.00**	0.26	0.04*	0.03	0.79
Total	−0.98	0.00**	0.50	0.01*	0.27	0.23	0.24	0.27

*$p < 0.05$; ** $p < 0.01$.

There were statistically significant differences between boys and girls in the means of all SDQ scales and subscales except the hyperactivity subscale. Statistically significant differences were observed in the conduct problems and hyperactivity subscales when comparing the two language versions of the SDQ, which also resulted in statistically significant differences in the mean scores for externalising difficulties and total difficulties. When age groups were analysed, more differences were observed between 11 and 13-year-olds than between 13 and 15-year-olds.

2.1.2 SDQ internal consistency

The results of the internal consistency analysis for the adolescent self-report version of the SDQ in the general and clinical population samples and for the parent version of the SDQ in the clinical population sample are presented in Table 2.2.

Table 2.2

Internal consistency measures (Cronbach's alphas) for SDQ scales and subscales in general and help-seeking (clinical) population samples of Latvian adolescents

SDQ scale	General population		Clinical population	
	Self-report (Latvian)	Self-report (Russian)	Self-report (Latvian)	Parent-report (Latvian)
Emotional problems	0.69	**0.71**	**0.75**	0.68
Conduct problems	0.32	0.33	0.42	0.65
Hyperactivity	0.49	0.55	0.60	**0.74**
Peer problems	0.53	0.41	0.61	0.55
Total difficulties	**0.71**	**0.74**	**0.77**	**0.75**
Prosocial behaviour	0.68	0.67	**0.71**	**0.75**
Internalising difficulties	**0.70**	0.68	**0.77**	0.69
Externalising difficulties	0.55	0.58	0.61	**0.79**

The analysis of Cronbach's alphas shows that the internal consistency scores for the SDQ adolescent self-report questionnaire in the general population in Latvian and Russian are very similar. Similarly, internal consistency scores are similar within subscales, only slightly higher in the clinical group compared to the general population. In contrast, the internal consistency scores of the parent-report on the externalising scales (conduct problems, hyperactivity) are higher than those of the adolescent self-report.

In the general population sample, only the emotional problems, internalising difficulties and total difficulties scales reached a sufficient level of internal consistency (Cronbach's alpha above 0.7), and the prosocial behaviour subscale was also close. The hyperactivity and externalising difficulties scales showed insufficient internal consistency in the adolescent self-report (Cronbach's alpha between 0.5 and 0.6), whereas they reached a sufficient level of internal consistency in the parent-report version. In contrast, the lowest scores were for

the behavioural difficulties subscale in the self-report version of the questionnaire (Cronbach alphas below 0.5), indicating a very low level of internal consistency, which makes reliable interpretation of the subscale results very difficult.

2.1.3 SDQ factor structure

The confirmatory factor analysis (CFA) approach was utilised to specify and validate the original 5-factor model proposed by Robert Goodman and its 3-factor alternative model with higher-order externalising and internalising factors (Goodman, 2001; Goodman et al., 2010). In the analysis, the fit of both models was explored: the 1st-order model and the 2nd-order model. The model fit indices for these are reported in Table 2.3.

Table 2.3

Fit indices for first-order and second-order CFA models of the SDQ

	CFI	RMSEA	RMSEA 90 % CI lower	RMSEA 90 % CI upper	SRMR
1st order	0.816	0.079	0.077	0.081	0.092
2nd order	0.797	0.083	0.081	0.085	0.096

Overall, the model comparative fit index (CFI) is 0.816 for the 1st-order model and even lower, 0.797. for the 2nd-order model, which is too low according to Hu and Bentler's suggestions that CFA should be at least 0.95. Also, the other commonly used CFA goodness-of-fit measures are well outside of the recommended goodness-of-fit range for both models: RMSEA, including 90 % CI, has been ranging from 0.077 to 0.081 for the lower bounds and from 0.081 to 0.085 for the upper bounds (recommended ≤ 0.05 and ≤ 0.10 respectively), and standardised root mean square error (SRMR) has been 0.092 and 0.096 (recommended ≤ 0.08) (Hu and Bentler, 1999). Therefore, we must be very cautious in interpreting the results of both models.

In Figures 2.1 and 2.2. the CFA loadings plot illustrates the second-order factor model. This visual representation was chosen for its comprehensiveness, encapsulating the first-order and second-order structures within a single model. The observed variables, corresponding to individual SDQ items, are denoted by squares. Each item is linked by a path to its respective first-order latent factor, indicated by circles labelled 'emotions', 'peers', 'conduct', 'hyperactivity', and 'prosocial'. The path loadings, represented by arrows, depict the strength and direction of the relationships between the items and their factors, with the values adjacent to the arrows signifying standardised factor loadings. Most loadings range from 0.40 to 0.80. signifying that most items have a moderate relationship with their underlying factors. The higher-order factors represented by circles 'internalising' and 'externalising' are constituted by the first-order factors 'emotions' and 'peers', and 'conduct' and 'hyperactivity', respectively. The arrows between first-order and second-order factors depict the degree to which each first-order factor contributes to the higher-order construct, with the associated values indicating the standardised loadings.

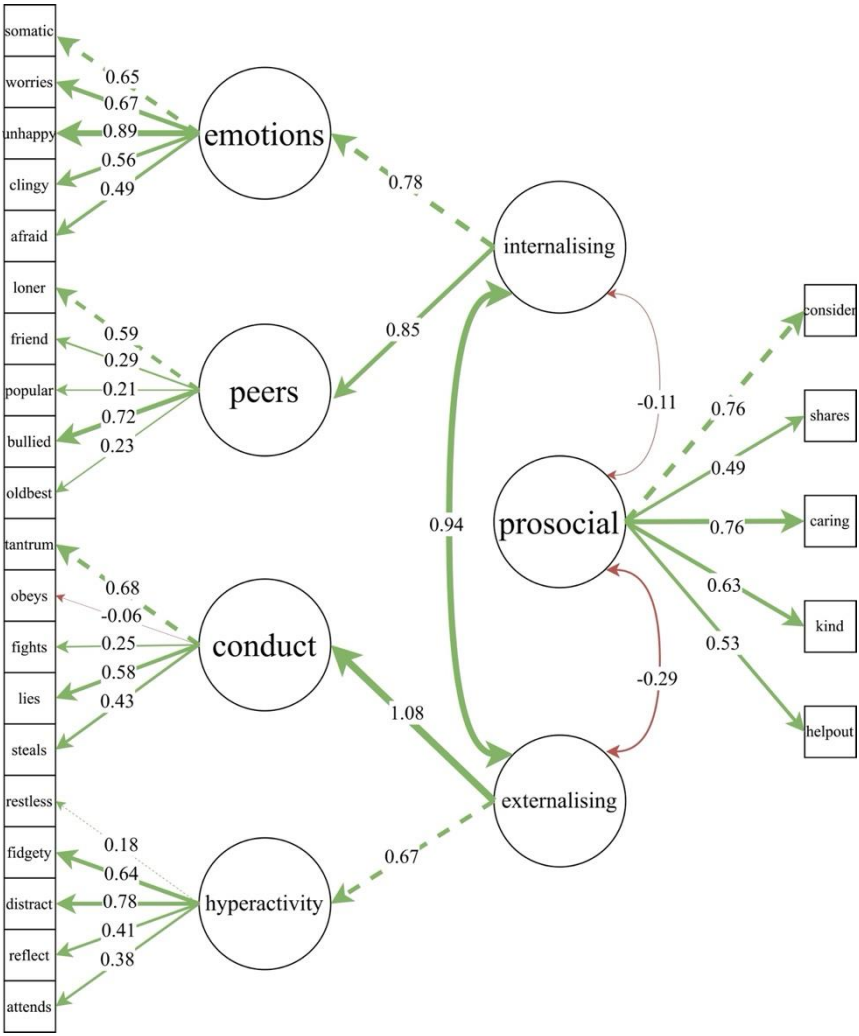

Figure 2.1 **Path diagram with standardised parameters of the second-order SDQ confirmatory factor model for Latvian language group**

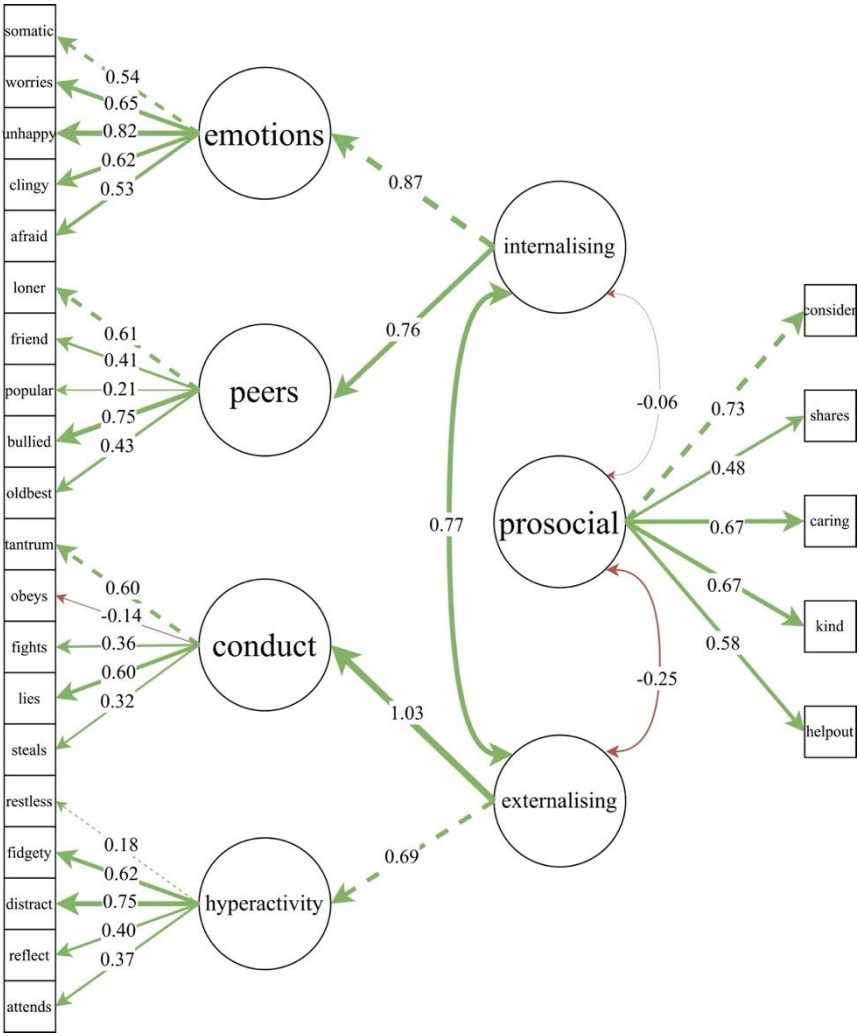

Figure 2.2 **Path diagram with standardised parameters of the second-order SDQ confirmatory factor model for Russian language group**

In efforts to enhance the Comparative Fit Index (CFI), two primary strategies were explored: removing items with lower factor loadings and

modifying the model structure. Still, in either case, it was not possible to achieve CFI higher than 0.85 without entirely altering the model.

2.1.4 SDQ Latvian adolescent population norms

Annex 4 presents the percentile ranks of raw scores for Latvian and Russian language versions of the self-report SDQ subscales. We found significant differences in some of the subscales (e.g. hyperactivity subscale) between the language versions of the SDQ in terms of scores that identify a proportion of the population scoring over the 80th and the 90th percentile, so the normative scores had to be determined separately for two language versions of the SDQ.

Annex 5. we have proposed the banding scores based on the analysis of the Latvian and Russian language versions of the SDQ. We aimed to determine the banding score conservatively to avoid labelling too large of a group of adolescents as “borderline” or “abnormal” and avoid possible false positive results.

Due to the median results of the Latvian adolescent population being significantly skewed towards the higher scores on most of the subscales of the SDQ, in comparison to the original UK population sample, the conservative normative approach that has been adopted in this study to determine the normative scores has resulted in very narrowly defined “borderline” and “abnormal” groups. The differences in banding scores between the Latvian and Russian language versions of the SDQ were observed in the emotional and conduct problems subscale and, consequently, all the compound scales.

2.1.5 Predictive properties of the SDQ in a clinical sample

Of the 207 young people in the clinical population, 58.9 % (n = 122) were clinically diagnosed with internalising mental disorders and 23.2 % (n = 48) with externalising mental disorders after examination by a child psychiatrist. Another

23.2 % (n = 48) were diagnosed with some other mental disorder (e.g. neurodevelopmental disorder, organic mental disorder, etc.). 5.3 % (n = 11) were diagnosed with comorbid internalising and externalising mental disorders.

The results of the SDQ screening are shown in Table 2.4. As expected in a clinical help-seeking population, screening results show a higher proportion of difficulties than in the general population. 30.8 % of adolescents received a positive screening result on the emotional difficulties subscale , 37.3 % on the internalising difficulties subscale and 31.1 % on the overall difficulties subscale. Interestingly, the proportion of young people who scored "abnormal" on the behavioural difficulties subscale and the non-social behaviour subscale of the SDQ screening did not differ from the general population.

Adjusted for age and gender, adolescents in the clinical group were 5.4 times more likely to reach the "abnormality" threshold (above the 90th population percentile) in emotional problems, 3.0x in hyperactivity, 2.8 x in peer problems and 4.5x in general difficulties.

Table 2.4

Proportion of SDQ screening results in a sample of clinical adolescents using cut-off values for the Latvian population

SDQ scale	Adolescent self-report		
	Normal (%)	Borderline (%)	Abnormal (%)
Emotional problems	46.0	23.2	30.8
Behavioural problems	83.1	12.9	4.0
Hyperactivity	72.4	10.8	16.7
Peer problems	75.5	11.5	13.0
Non-prosocial behaviour	86.8	6.9	6.4
Internalising difficulties	55.4	7.3	37.3
Externalising difficulties	71.7	15.7	12.6
Total difficulties	57.9	11.1	31.1

Annex 6 contains the clinical utility indices of the SDQ adolescent self-administered screening tool.

The presence of a diagnosis of internalising disorders was significantly correlated with positive screening results on the emotional problems, internalising difficulties and total difficulties scales. A diagnosis of an externalising disorder was significantly correlated with positive screening results on the hyperactivity subscale and negative screening results on the emotional problems and internalising difficulties scales.

The sensitivity and specificity of the internalising difficulties scale for diagnoses of internalising disorders were 56 % and 73 %, respectively. The sensitivity and specificity of the externalising difficulties scale for diagnoses of externalising disorders were 38 % and 75 %.

Overall, none of the SDQ adolescent self-report scales showed sufficient clinical utility ($LHR^+ > 7$. $LHR^- < 0.3$. $OR^D > 20$) to indicate their ability to be useful in clinical decision-making (Fischer et al., 2003).

2.1.6 SDQ parent and adolescent self-report agreement in a clinical sample

In the parent-report, the SDQ subscales had similar or lower mean values than the adolescent self-report.

Table 2.5

SDQ screening results for adolescent self-report and parent-report questionnaires mean values and agreement

SDQ scale	Adolescent self-report			Parent-report			Agreement	
	n	Mean	SD	n	Mean	SD	ICC	p
Emotional problems	198	5.62	2.81	190	5.37	2.54	0.617	0.000
Conduct problems	201	3.54	1.8	192	3.16	2.12	0.567	0.000
Hyperactivity	203	5.06	2.27	190	4.61	2.62	0.408	0.000
Peer problems	200	3.91	2.31	188	4.01	2.16	0.553	0.000
Non-prosocial behaviour	204	7.07	2.21	193	7.09	2.25	0.551	0.000
Internalising difficulties	193	9.54	4.38	181	9.28	3.79	0.617	0.000

Table 2.5 continued

SDQ scale	Adolescent self-report			Parent-report			Agreement	
	n	Mean	SD	n	Mean	SD	ICC	p
Externalising difficulties	198	8.61	3.28	184	7.76	4.11	0.514	0.000
Total difficulties	190	18.07	6.3	172	16.94	5.97	0.422	0.000

The agreement between adolescents' and parents' scores was moderate on most of the SDQ subscales (ICC values between 0.5 and 0.75) but low on the hyperactivity subscale and the total difficulty scale (ICC below 0.5) (Koo and Li, 2016).

2.2 Prevalence, socio-demographic and health-related determinants of internalising and externalising difficulties in the general adolescent population

2.2.1 SDQ survey results by age and gender

Overall, 9.2 % (n = 359. CI 95 % 8.3–10.1) of young people had a significant mental health difficulty, i.e. an SDQ screening score on the total difficulty scale above the 90th population percentile. Significant gender and age differences were observed in the proportion of total difficulties. Boys had the highest proportion of total difficulties in the 11-year age group (10.9 %, n = 69. CI 95 % 8.6–13.6), whereas girls had the highest proportion in the 13 (12 %, n = 81. CI 95 % 9.6–14.7) and 15-year age groups (11.1 %, n = 72. CI 95 % 8.8–13.8). These differences are largely explained by the different profiles of internalising and externalising difficulties across gender- and age-groups. For boys, the level of internalising difficulties was not significantly different across all age groups, but for girls, it increased significantly with age and began to significantly exceed the level of internalising difficulties for boys in the 13- and 15-year age groups, reaching 14.1 % in the 15-year age group (n = 93. CI 95 % 11.5–17.0). There were also no significant age differences in the level of

externalising difficulty for boys, while it was statistically significantly lower for girls than for boys in the 11-year age group, 4.0 % (n = 29. CI 95 % 2.7–5.7) vs 7.7 % (n = 52. CI 95 % 5.8–10.0), respectively.

2.2.2 The effects of the independent socio-demographic and health-related factors

The following tables (Table 2.6. Table 2.7. Table 2.8) summarise the results of the gender-stratified, socio-demographic factor-adjusted binomial regression models for three dependant variables – total difficulties, internalising and externalising difficulties, as measured by "abnormal" (above 90th percentile) score in the appropriate SDQ compound scales.

Table 2.6

The gender-stratified socio-demographic factor-adjusted association between health-related factors and total mental health difficulties in Latvian general adolescent population

Associated factors	Total difficulties			
	Boys		Girls	
	OR	(95 % CI)	OR	(95 % CI)
Socio-demographic factors				
Age group (13 to 11)	**0.562**	0.378–0.836	**1.616**	1.121–2.327
Age group (13 to 15)	1.022	0.654–1.597	1.147	0.817–1.612
Family affluence (low)	1.158	0.793–1.691	**1.561**	1.144–2.130
Family structure (other)	1.145	0.808–1.621	1.216	0.902–1.639
Place of residence (Riga)	1.021	0.689–1.512	0.844	0.593–1.202
Language at home (Latvian)	1.183	0.799–1.752	1.129	0.810–1.574
Helath indicators				
Self-rated health (not good)	**3.038**	2.119–4.354	**4.392**	3.218–5.995
Mean life satisfaction (low)	**3.222**	2.153–4.821	**6.408**	4.651–8.828
Multiple health complaints (≥2)	**2.359**	1.571–3.542	**2.974**	2.193–4.034
Health behaviours				
Sleep duration (< 7h)	**2.488**	1.678–3.688	**2.024**	1.453–2.818
Physical activity (low)	**1.480**	1.021–2.144	1.345	0.992–1.824
Intense physical activity (low)	1.373	0.920–2.049	**1.598**	1.178–2.167
Risk behaviours				
Smoking (yes in last 30 days)	1.570	0.901–2.735	**1.846**	1.207-2.823

Table 2.6 continued

Associated factors	Total difficulties			
	Boys		Girls	
	OR	(95 % CI)	OR	(95 % CI)
E-cigarette use (yes in last 30 days)	1.583	0.948–2.643	1.645	0.994–2.723
Alcohol use (yes in last 30 days)	**2.846**	1.879–4.309	**1.810**	1.283–2.553
Drunkenness (yes in last 30 days)	**2.707**	1.507–4.863	**1.910**	1.203–3.034
Marijuana use (yes in last 30 days)	**2.842**	1.136–7.111	1.537	0.641–3.682
Problematic social media use (yes)	**3.965**	2.440–6.445	**3.556**	2.457–5.146
Sexual activity (yes)	2.110	0.969–4.594	1.615	0.794–3.282
Spiritual well-being				
Relationship with others (not important)	**2.614**	1.716–3.984	1.573	0.940–2.633
Relationship with self (not important)	**2.313**	1.421–3.765	**5.022**	3.238–7.788
Relationship with nature (not important)	**1.890**	1.279–2.794	**2.190**	1.569–3.056
Relationship with transcendent (not important)	**0.440**	0.309–0.627	1.047	0.770–1.424
Social support				
Family support (low)	**1.633**	1.005–2.654	**3.028**	2.149–4.267
Friend support (low)	**1.778**	1.198–2.640	**2.629**	1.856–3.723
Bullying				
Bullying others (often)	**2.602**	1.815–3.731	**1.897**	1.309–2.749
Being bullied (often)	**2.377**	1.671–3.381	**3.700**	2.734–5.008
E-bullying others (often)	**3.184**	2.010–5.045	**3.409**	1.939–5.994
Being e-bullied (often)	**2.629**	1.527–4.527	**2.296**	1.210–4.356
Mean life satisfaction (low)	**3.222**	2.153–4.821	**6.408**	4.651–8.828
Multiple health complaints (≥2)	**2.359**	1.571–3.542	**2.974**	2.193–4.034
Health behaviours				
Sleep duration (< 7h)	**2.488**	1.678–3.688	**2.024**	1.453–2.818
Physical activity (low)	**1.480**	1.021–2.144	1.345	0.992–1.824
Intense physical activity (low)	1.373	0.920–2.049	**1.598**	1.178–2.167
Risk behaviours				
Smoking (yes in last 30 days)	1.570	0.901–2.735	**1.846**	1.207-2.823
E-cigarette use (yes in last 30 days)	1.583	0.948–2.643	1.645	0.994–2.723
Alcohol use (yes in last 30 days)	**2.846**	1.879–4.309	**1.810**	1.283–2.553
Drunkenness (yes in last 30 days)	**2.707**	1.507–4.863	**1.910**	1.203–3.034

Table 2.6 continued

Associated factors	Total difficulties			
	Boys		Girls	
	OR	(95 % CI)	OR	(95 % CI)
Marijuana use (yes in last 30 days)	**2.842**	1.136–7.111	1.537	0.641–3.682
Problematic social media use (yes)	**3.965**	2.440–6.445	**3.556**	2.457–5.146
Sexual activity (yes)	2.110	0.969–4.594	1.615	0.794–3.282
Spiritual well-being				
Relationship with others (not important)	**2.614**	1.716–3.984	1.573	0.940–2.633
Relationship with self (not important)	**2.313**	1.421–3.765	**5.022**	3.238–7.788
Relationship with nature (not important)	**1.890**	1.279–2.794	**2.190**	1.569–3.056
Relationship with transcendent (not important)	**0.440**	0.309–0.627	1.047	0.770–1.424
Social support				
Family support (low)	**1.633**	1.005–2.654	**3.028**	2.149–4.267
Friend support (low)	**1.778**	1.198–2.640	**2.629**	1.856–3.723
Bullying				
Bullying others (often)	**2.602**	1.815–3.731	**1.897**	1.309–2.749
Being bullied (often)	**2.377**	1.671–3.381	**3.700**	2.734–5.008
E-bullying others (often)	**3.184**	2.010–5.045	**3.409**	1.939–5.994
Being e-bullied (often)	**2.629**	1.527–4.527	**2.296**	1.210–4.356
School environment				
School satisfaction (low)	**2.340**	1.648–3.322	**1.505**	1.092–2.074
Schoolwork pressure (high)	**2.410**	1.695–3.426	**2.842**	2.099–3.847
Socio-demographic factors				
Age group (13 to 11)	**0.831**	0.551–1.253	1.399	0.989–1.979
Age group (13 to 15)	1.208	0.771–1.893	0.857	0.623–1.179
Family affluence (low)	1.335	0.905–1.968	**1.520**	1.135–2.035
Family structure (other)	1.104	0.766–1.592	1.077	0.812–1.427
Place of residence (Riga)	0.914	0.599–1.396	0.833	0.599–1.160
Language at home (Latvian)	1.056	0.706–1.579	1.139	0.836–1.554
Helath indicators				
Self-rated health (not good)	**2.706**	1.850–3.958	**4.061**	3.047–5.413
Mean life satisfaction (low)	**3.551**	2.355–5.354	**4.819**	3.582–6.483
Multiple health complaints (≥2)	**2.059**	1.345–3.153	**2.951**	2.217–3.927

Table 2.7

The gender-stratified socio-demographic factor-adjusted association between health-related factors and internalising difficulties in Latvian general adolescent population

Associated factors	Internalising difficulties			
	Boys		Girls	
	OR	(95 % CI)	OR	(95 % CI)
Socio-demographic factors				
Age group (13 to 11)	**0.831**	0.551–1.253	1.399	0.989–1.979
Age group (13 to 15)	1.208	0.771–1.893	0.857	0.623–1.179
Family affluence (low)	1.335	0.905–1.968	**1.520**	1.135–2.035
Family structure (other)	1.104	0.766–1.592	1.077	0.812–1.427
Place of residence (Riga)	0.914	0.599–1.396	0.833	0.599–1.160
Language at home (Latvian)	1.056	0.706–1.579	1.139	0.836–1.554
Helath indicators				
Self-rated health (not good)	**2.706**	1.850–3.958	**4.061**	3.047–5.413
Mean life satisfaction (low)	**3.551**	2.355–5.354	**4.819**	3.582–6.483
Multiple health complaints (≥2)	**2.059**	1.345–3.153	**2.951**	2.217–3.927
Health behaviours				
Sleep duration (< 7h)	**1.899**	1.249–2.889	**1.877**	1.375–2.563
Physical activity (low)	**1.533**	1.044–2.250	**1.432**	1.078–1.901
Intense physical activity (low)	**1.667**	1.114–2.493	**1.529**	1.148–2.037
Risk behaviours				
Smoking (yes in last 30 days)	1.042	0.547–1.985	0.972	0.626–1.511
E-cigarette use (yes in last 30 days)	0.792	0.421–1.487	1.114	0.668–1.859
Alcohol use (yes in last 30 days)	**1.843**	1.179–2.883	1.385	0.998–1.923
Drunkenness (yes in last 30 days)	1.626	0.825–3.203	1.293	0.812–2.058
Marijuana use (yes in last 30 days)	1.026	0.298–3.536	0.883	0.357–2.182
Problematic social media use (yes)	**2.820**	1.650–4.820	**2.201**	1.509–3.211
Sexual activity (yes)	0.683	0.234–1.993	0.891	0.423–1.879
Spiritual well-being				
Relationship with others (not important)	1.617	1.000–2.613	1.044	0.605–1.801
Relationship with self (not important)	**1.762**	1.036–2.999	**4.093**	2.663–6.291
Relationship with nature (not important)	0.936	0.587–1.490	**1.439**	1.027–2.014

Table 2.7 continued

Associated factors	Internalising difficulties			
	Boys		Girls	
	OR	(95 % CI)	OR	(95 % CI)
Relationship with transcendent (not important)	**0.439**	0.303–0.634	0.931	0.701–1.237
Social support				
Family support (low)	**1.737**	1.056–2.857	**2.092**	1.485–2.948
Friend support (low)	**2.392**	1.619–3.534	**2.665**	1.920–3.700
Bullying				
Bullying others (often)	1.396	0.931–2.092	**1.494**	1.035–2.158
Being bullied (often)	**2.522**	1.750–3.633	**3.659**	2.748–4.872
E-bullying others (often)	1.541	0.884–2.687	**2.738**	1.572–4.769
Being e-bullied (often)	**2.336**	1.329–4.106	**5.378**	3.481–8.309
School environment				
School satisfaction (low)	**1.965**	1.359–2.840	**1.457**	1.078–1.969
Schoolwork pressure (high)	**2.297**	1.593–3.312	**2.341**	1.761–3.111

Table 2.8

The gender-stratified socio-demographic factor-adjusted association between health-related factors and externalising difficulties in Latvian general adolescent population

Associated factors	Externalising difficulties			
	Boys		Girls	
	OR	(95 % CI)	OR	(95 % CI)
Socio-demographic factors				
Age group (13 to 11)	0.826	0.546–1.251	1.620	0.993–2.641
Age group (13 to 15)	0.885	0.579–1.355	1.082	0.695–1.684
Family affluence (low)	0.872	0.580–1.310	1.145	0.752–1.745
Family structure (other)	1.184	0.830–1.689	**1.688**	1.143–2.492
Place of residence (Riga)	1.155	0.786–1.695	0.820	0.510–1.316
Language at home (Latvian)	**1.767**	1.155–2.703	1.090	0.708–1.680
Helath indicators				
Self-rated health (not good)	**1.824**	1.237–2.690	**2.498**	1.681–3.711
Mean life satisfaction (low)	**2.430**	1.589–3.716	**3.645**	2.420–5.491
Multiple health complaints (≥ 2)	**1.897**	1.219–2.953	**1.849**	1.235–2.768
Health behaviours				
Sleep duration (< 7h)	**1.882**	1.254–2.824	**2.639**	1.735–4.014
Physical activity (low)	1.224	0.826–1.814	0.917	0.605–1.392

Table 2.8 continued

Associated factors	Externalising difficulties			
	Boys		Girls	
	OR	(95 % CI)	OR	(95 % CI)
Intense physical activity (low)	1.205	0.787–1.844	1.076	0.708–1.634
Risk behaviours				
Smoking (yes in last 30 days)	**2.332**	1.428–3.807	**2.850**	1.716–4.734
E-cigarette use (yes in last 30 days)	1.580	0.971–2.573	**2.140**	1.186–3.860
Alcohol use (yes in last 30 days)	**2.388**	1.581–3.607	**3.023**	1.948–4.693
Drunkenness (yes in last 30 days)	**2.737**	1.575–4.757	**1.987**	1.116–3.538
Marijuana use (yes in last 30 days)	2.343	0.949–5.783	0.911	0.262–3.169
Problematic social media use (yes)	**3.528**	2.110–5.899	**4.997**	3.202–7.798
Sexual activity (yes)	**2.587**	1.266–5.287	1.019	0.382–2.720
Spiritual well-being				
Relationship with others (not important)	**2.630**	1.712–4.041	**4.667**	2.836–7.679
Relationship with self (not important)	1.604	0.921–2.795	1.816	0.935–3.529
Relationship with nature (not important)	**1.898**	1.279–2.816	**2.194**	1.431–3.364
Relationship with transcendent (not important)	**0.679**	0.475–0.969	1.173	0.778–1.769
Social support				
Family support (low)	1.188	0.696–2.027	**1.777**	1.103–2.863
Friend support (low)	1.192	0.772–1.841	1.536	0.935–2.523
Bullying				
Bullying others (often)	**3.676**	2.568–5.263	**4.595**	3.034–6.960
Being bullied (often)	**2.003**	1.385–2.896	**2.025**	1.350–3.038
E-bullying others (often)	**3.360**	2.130–5.300	**3.822**	2.002–7.296
Being e-bullied (often)	**2.600**	1.492–4.531	**2.296**	1.210–4.356
School environment				
School satisfaction (low)	**1.963**	1.371–2.810	**1.850**	1.234–2.776
Schoolwork pressure (high)	**2.185**	1.528–3.125	**2.410**	1.621–3.584

3 Discussion

3.1 Psychometric properties of the SDQ

This study analysed the psychometric properties of the Latvian and Russian versions of the SDQ self-report questionnaire in a representative sample of the Latvian adolescent general population and a convenience sample of the clinical help-seeking population.

The study shows that using the SDQ adolescent self-report questionnaire in the general Latvian adolescent population results in significantly higher median values for all subscales and scales than in the original UK adolescent population. If we assume that the SDQ adolescent self-report is a valid instrument that accurately and reliably identifies the psychometric constructs within its structure, namely internalising and externalising difficulties, then this difference in median values could imply a significantly higher prevalence of psychopathological phenomena in the Latvian adolescent population than in the UK adolescent population in which the instrument was standardised (Goodman, 2001). However, this seems unlikely, as the author of the screening instrument himself points out in his 2012 publication, which analysed data on almost 30 000 young people from 7 countries, concluding that the marked differences in SDQ score means between countries found in the study are unlikely to reflect real differences in the prevalence of mental disorders and recommending the use of population-specific norms to interpret SDQ screening data (Goodman et al., 2012).

In addition to the above, examining the psychometric properties of the Latvian and Russian language adaptation of the SDQ self-report questionnaire in a sample of Latvian adolescents shows significant problems in the reliability of the scales and subscales, as well as in the factor structure of the questionnaire. The analysis of the internal consistency of the subscales and scales of the SDQ adolescent self-report questionnaire conducted within the framework of the study

showed that only the emotional problems, prosocial behaviour, internalising difficulties and total difficulties scales reach a sufficient level of internal consistency and are sufficiently reliable. Even though different language adaptations of the SDQ generally show sufficient reliability for the SDQ total difficulties scale, previous studies from different countries often show similar problems with the reliability of the subscales, most often in the conduct problems and peer problems subscales (Becker et al., 2018; Giannakopoulos et al., 2009; Mellor, 2005; Muris, Meesters, and Van den Berg, 2003; Riso et al., 2010). In their 2007 validation study of the SDQ self-report questionnaire in Russian adolescents, Ruchkin and colleagues reported internal consistency scores that are very similar to our findings in a group of Latvian Russian-speaking adolescents (Ruchkin, Koposov, and Schwab-Stone, 2007).

When evaluating previously published studies on the latent factor structure of the different local adaptation of the SDQ adolescent self-report questionnaire, differences are evident, i.e. there are study authors who support the original five-factor structure (Gaete et al., 2018; Giannakopoulos et al., 2009; Ruchkin et al., 2007), while others suggest a modified five-factor solution (Bøe et al., 2016; Duinhof et al., 2019; Karlsson et al., 2022; Ortuño-Sierra et al., 2022), or even a broader three-factor solution (Riso et al., 2010). Our results in the Latvian adolescent population do not correspond exactly to any of the above solutions, and we were unable to find modifications that would allow us to achieve an acceptable fit to one of the aforementioned models without completely changing the model itself, which would, in turn, make it impossible to interpret and compare its results. This finding is consistent with that of Stevanovic and colleagues in a cross-cultural sample of adolescents from 7 countries (Stevanovic et al., 2015), as well as other studies from English-speaking adolescent populations (Mellor and Stokes, 2007; Percy, McCrystal, and Higgins, 2008).

Additionally, the difference in median values observed in the Latvian adolescent population could be related not only to the challenges associated with the translation of the psychometric instrument and the constructs it measures to other languages but also to the natural ageing of questionnaire norms, given that the standardisation studies on which the SDQ author's proposed scale cut-off values are based were carried out more than twenty years ago (Goodman, Meltzer, and Bailey, 1998). More recent studies with the SDQ also show a higher prevalence of the SDQ-measured difficulties in the UK adolescent population (Emerson et al., 2023) which may indicate an increasing prevalence of psychiatric difficulties, but may also reflect the natural evolution of socio-cultural norms and language use over time in young people's populations. The above is one of the main known challenges in psychiatric research, which, given the complexity of the object of study, is forced to rely solely on the indirect language-mediated recording and measurement of people's subjective experiences. This is also the reason why psychometric instruments require not only a thorough adaptation and validation process before they can be safely used in new linguistic and cultural contexts, but also regular re-validation and re-standardisation also in populations where the validity of the instrument has already been scientifically proven (Sewell, 1943).

Because of the above, there is a high risk that the SDQ adolescent self-report questionnaire will be calculated using the cut-off values proposed by the authors of the original questionnaire, as has previously been done in the Latvian clinical practice context (Bezborodovs et al., 2022) and in the context of cross-cultural studies, overestimation of the prevalence of psychopathological symptoms in the population (at the expense of the inflation of the false-positive results) is very likely. The findings of our study are broadly similar to those of studies conducted elsewhere in the world (Becker et al., 2018; Ortuño-Sierra et al., 2022; Vugteveen, de Bildt, and Timmerman, 2022) and highlight the need to

use local population thresholds for correct interpretation of SDQ results. This is important for studies conducted within a single country, as it avoids drawing inappropriate conclusions about the prevalence of psychopathological phenomena in the study population, but it is particularly important for comparative studies between countries.

The Thesis study found significant gender differences in scores on all SDQ scales and subscales except the hyperactivity subscale. Girls scored significantly higher than boys on the emotional problems subscale, the internalising difficulties subscale and the total difficulties scale. Boys scored higher on the conduct and peer problems subscales, the non-prosocial behaviour subscale and the externalising difficulties scale. This finding is consistent with many other standardisation studies of the SDQ (Goodman, 2001) as well as with a wide range of literature on the prevalence of internalising and externalising psychopathological phenomena in different populations (Achenbach et al., 2016). The absence of gender differences in the SDQ hyperactivity subscale is surprising overall, as based on the theory base and empirical evidence from around the world, hyperactivity symptoms should be more prevalent in boys than girls. The results for the Latvian population could possibly be explained by the generally low and insufficient internal consistency of this subscale of the SDQ, which means that we can be sure that in the Latvian adolescent population, the items of this subscale of the SDQ do not measure the same psychometric construct that they were created to measure in the original SDQ questionnaire.

The Thesis study also found significant differences in scores on SDQ subscales and scales between age groups, but significantly more between 11- and 13-year-olds than between 13- and 15-year-olds. This finding could potentially be explained by the normal developmental stages of adolescents. Not all respondents have entered puberty at age 11. so a more rapid maturational shift is

expected between 11 and 13 than between 13 and 15. when a higher proportion of respondents are already in full pubertal development (Zöderström, 2010).

Significant differences found between the Latvian and Russian versions of the SDQ adolescent self-report questionnaire on the behavioural difficulties and hyperactivity subscales are most likely to be language-based and reflect the different semantic fields of the words used in the question wording to describe "bad behaviour" in Latvian and Russian. These differences may also be culturally based and reflect the different social expectations of behaviour and different self-perceptions of 'problematic' behaviour of Latvian and Russian-speaking young people.

This finding adds to the ongoing debate in the literature on the cross-cultural validity and applicability of the SDQ and other psychometric instruments (Duinhof et al., 2019; Stevanovic et al., 2015).

The sensitivity, specificity and other predictive properties of the self-report version of the SDQ found in the Latvian clinical sample of adolescents are slightly lower than those reported in other countries. In a study by Brøndbo et al. in Norwegian children's mental health institutions, the predictive properties of the SDQ for conduct disorder were Sen – 0.83. Spe – 0.75. ORD – 14.41. hyperactivity: Sen – 0.77. Spe – 0.80. ORD – 13.35 and emotional disorders: Sen – 0.47. Spe – 0.87. ORD – 6.05 (Brøndbo et al., 2011). It should be noted that the Norwegian study collected data from both the SDQ self-report and parent and teacher report, which may improve the predictive properties of the screening tool (Goodman et al., 2004). In a study by Danish colleagues, the predictive properties of the self-report version of the SDQ for hyperactivity were Sen 0.59. Spe 0.76. ORD 4.64. for conduct disorder Sen 0.32. Spe 0.87. ORD 3.24. for emotional disorders: Sen 0.46. Spe 0.84. ORD 4.64 (Vugteveen et al., 2018), which is closer to the Latvian data obtained in the Thesis study. Overall, according to the studies published so far, the single-informant version of the SDQ does not reach a level

of clinical utility that could be considered sufficient to warrant its use for screening in a highly psychopathologically saturated clinical sample of adolescents.

3.2 Prevalence and association of emotional and behavioural difficulties with socio-demographic factors in the Latvian adolescent population

The results of the dissertation study show that adolescent girls in Latvia show higher levels of mental difficulties than boys. This finding is consistent with a wide range of previously published scientific studies, for example, a recent analysis of data from 79 countries found not only that gender differences in the prevalence of mental health problems in adolescence are more pronounced in countries with higher income (gross domestic product per capita), but also that there are gender differences in all mental health outcomes (Campbell, Bunn, and Patalay, 2021). The gender-specific relationships in mental health outcomes observed in the dissertation study are similar in direction and magnitude to results in other countries of the European Community, the United States and Canada (Campbell et al., 2021; Inchley et al., 2018). Similar to other studies (Ravens-Sieberer et al., 2008) Latvian adolescents from less affluent households were found to be more likely to suffer from emotional and behavioural difficulties. In adulthood, the relationship between poverty and mental disorders becomes progressively more complex and bidirectional. In childhood and adolescence, it is relatively easily explained by inequalities in access to resources of all kinds, such as education and health care, as well as a higher likelihood of various adverse childhood experiences (violence, neglect, family dysfunction) that can both trigger and contribute to the development of mental disorders later in life (McLaughlin et al., 2012).

The dissertation study found no significant effect of age on the overall prevalence of mental health problems in Latvian adolescents, which could be

attributed to the relatively narrow age group of 11. 13 and 15-year-olds, which corresponds to early to middle adolescence. This age group is relatively homogeneous, all young people in the sample continued to receive compulsory primary education, young people in late adolescence or early adulthood were not included in the sample, nor were out-of-school adolescents and young people receiving education in special education institutions due to health or social problems. However, it is clear from the sex-stratified analysis that another reason for the absence of age effects in the prevalence of common mental health difficulties is the different and opposite developmental trajectories of internalising, externalising and total difficulties for each of the sexes, which in the non-stratified analysis are generally equalised.

The age-related increase in the prevalence of emotional difficulties among girls in the Latvian adolescent population is worrying, but it is consistent with the findings of many other studies. Research consistently shows that the prevalence of depression increases during adolescence, and that girls are significantly more likely than boys to have it (Hankin et al., 2015). Various factors contribute to this age-related increase in depressive symptoms. The hormonal fluctuations that accompany puberty may play a role in the emotional dysregulation, while the cognitive and emotional demands of the transition from childhood to adulthood may create stressors that exacerbate depressive symptoms (Susman, Dorn, and Schiefelbein, 2003).

In addition, the proliferation of technology and social media in recent years has created new challenges, including bullying and cyberbullying, which disproportionately affect adolescent girls and can contribute to feelings of anxiety and low self-esteem (Kowalski et al., 2014). This relationship also emerged in the data from the dissertation study.

Contrary to the initial assumption, based on the literature analysis, that the risk of internalising and internalising difficulties could also be significantly

influenced by adolescents' family structure (growing up in a single-parent family), place of residence (living in a big city vs in a rural region) or belonging to a national minority (non-Latvian language as the language used at home), the data from the dissertation study do not show a significant association of these socio-demographic factors with mental health difficulties.

The data of the dissertation study show statistically significantly higher odds of externalising difficulties for girls from single-parent families, as well as higher odds of externalising difficulties for boys with Latvian as the home language of communication. This finding is more likely to be interpreted as a consequence of the problems described above in the internal consistency and factor structure of the externalising subscales of the SDQ than as a genuine difference in the prevalence of externalising psychopathological phenomena in an otherwise fairly homogenous Latvian adolescent population.

3.3 Prevalence and association of emotional and behavioural difficulties with health-related factors in the Latvian adolescent population

Health indicators

Analysing the relationship of different health-related factors, health behaviours and their influences on the severity of emotional and behavioural difficulties, the results show that the strongest predictor of overall mental health difficulties is self-rated life satisfaction. Adolescents who are generally dissatisfied with their lives are almost 5 times more likely to report significant mental health difficulties. A similar association was observed with self-rated health. Both constructs have been shown to have a high degree of overlap, but previous research has shown that self-rated life satisfaction has a slightly higher correlation with mental health difficulties and self-rated health with physical health. Although in the adolescent population, the mental health component of overall self-rated health remains a significant factor (Zullig, Valois, and Drane,

2005). The dissertation data support the view that self-rated life satisfaction and self-rated health can be used as important indicators of mental health difficulties in the Latvian adolescent population, both in public health research and in clinical practice. Furthermore, the results of the study suggest that low self-rated life satisfaction and self-rated health are more likely to be considered as indicators of emotional difficulties and to a much lesser extent behavioural difficulties.

This correlation is also supported by the correlation of psychological distress with subjective health complaints among adolescents, manifested as a variety of somatic symptoms, including headaches, stomachaches, fatigue and sleeping difficulties, which are not directly related to a physical illness and for which no somatic cause can be found on examination. It is known that, particularly among young people, the presence of such symptoms often correlates with mental distress (Campo, 2012).

The relationship between somatic symptoms and psychiatric distress is potentially bidirectional, as on the one hand mental distress can be somatised and communicated through the body, while on the other hand prolonged somatic complaints can lead to the development of secondary mental distress. However, the evidence base in the child and adolescent population supports a psycho-somatic rather than a somato-psychic mechanism of pathogenesis. For example, Janssen and colleagues, in a longitudinal study published in 2010 and conducted in a large general population cohort of adolescents in the Netherlands, analysed the associations between somatic complaints, anxiety and depression. The results indicate that the effects of anxiety and depression on somatic symptoms are strong, while the effects of somatic symptoms on anxiety and depression are significantly weaker and delayed in time (Janssens et al., 2010). This association highlights the importance for primary health care professionals to consider

psychological factors as potential causes of complaints in adolescents with multiple, recurrent, and unexplained health complaints.

Health behaviour

The link between health behaviours such as sleep, physical activity and adolescent mental health is important and potentially bidirectional. Research consistently shows that sleep and physical activity are crucial in promoting adolescent mental health (Wilhite et al., 2023). This relationship is also evident in the Latvian data.

Adequate and good quality sleep is essential for emotional regulation, cognitive functioning and general well-being. Inadequate sleep is associated with an increased risk of depression, anxiety, mood disorders and behavioural problems (Tarokh, Saletin, and Carskadon, 2016). Regular physical activity has been found to have many mental health benefits, including reducing symptoms of depression and anxiety, improving self-esteem and improving overall psychological well-being (Carney and Firth, 2021). In addition, physical activity can improve sleep quality by helping to regulate the sleep-wake cycle. Therefore, there is a correlation between sleep, physical activity and mental health in adolescents. Promoting healthy sleep habits and regular physical activity can have a positive impact on adolescents' mental well-being, highlighting the importance of including these lifestyle factors in comprehensive strategies to promote adolescent mental health.

Risk behaviour

The interconnection between high-risk behaviours such as smoking, drinking, problematic social media use and adolescent mental health is of great concern worldwide (Bozzini et al., 2021). Research consistently highlights the harmful impact of these behaviours on young people's well-being. Tobacco smoking and alcohol use in adolescence are associated with an increased risk of

developing mental health disorders such as depression, anxiety and substance use disorders. These behaviours contribute to physical health problems, impair neural development and exacerbate mental health problems. On the other hand, adolescents who have already developed anxiety and depression may use substances as a maladaptive coping strategy or "self-medication", thus continuing the vicious cycle of dual diagnosis (Tomáš and Lenka, 2023).

The results of the dissertation study show that for Latvian adolescents, the use of traditional tobacco products is more strongly correlated with the likelihood of internalising difficulties (for both genders, but more so for older adolescents), while the use of new electronic smoking devices is more strongly associated with externalising difficulties (mainly at the expense of younger girls), possibly indicating different mechanisms of association between these high-risk behaviours and psychiatric difficulties.

The link between smoking and internalising mental disorders is undisputed and well-researched, but the results of the conducted studies point to a complex, currently unclear and bidirectional relationship. In their systematic review of 110 research publications and 8 meta-analyses, Farooqui and colleagues conclude that the evidence base points to both shared biological and psychosocial risk factors for smoking and depression, depression as a cause of smoking initiation and continuation, and depression as a consequence of tobacco dependence (Farooqui et al., 2023). The association of new electronic smoking devices with psychological distress has not yet been studied as extensively, but the available data suggest that the population prevalence trends for these risk behaviours are markedly different from those for traditional tobacco smoking. In a large Canadian general population study, Dahal and colleagues show that concurrent cigarette and e-cigarette smoking is more common in the elderly population, while isolated e-cigarette use is more common in women and younger people, women are more likely than men to start using e-cigarettes at

a younger age, young people are more likely to use e-cigarettes for pleasure rather than as the smoking cessation method for which the devices were originally advertised (Dahal, Bhattarai, and Adhikari, 2022). Global studies in adolescent populations convincingly show the association of e-cigarette use with both internalising and externalising mental health difficulties (Audrain-McGovern et al., 2021; Green et al., 2018; Riehm et al., 2019). The Latvian adolescent population data showing a stronger association with externalising difficulties, specifically for girls, could potentially be explained by the fact that in 2017/2018. when the HBSC survey was conducted, this high-risk behaviour was still relatively less common and less socially normalised among young girls in Latvia. In this social context, it is young girls with externalising difficulties, who are also more impulsive, who may be more likely to engage in e-cigarette use. In this case, these high-risk behaviours should be seen as an indicator rather than a cause of behavioural difficulties.

Separately, the question on the experience of using 'electronic cigarettes' or 'vapers' used in the 2017/18 HBSC survey does not reflect the wide range of new electronic smoking devices, tobacco heating devices and smokeless tobacco products whose uncontrolled availability to young people in Latvia has caused great concern among public health professionals in recent years. In order to assess the prevalence and impact of these new devices and products on the health of children and young people, as well as the impact of the legislative changes made, it is necessary to carry out repeated measurements at the level of the general population.

Data from the Latvian adolescent population on the association of alcohol use with internalising and externalising difficulties confirm the well-documented correlation with both mechanisms of psychopathogenesis (mental health difficulties as a cause and a consequence of excessive alcohol use). Similar to studies in other countries (Meque et al., 2019), alcohol use has a stronger

association with externalising difficulties in the Latvian adolescent population, with Latvian data showing that self-reported alcohol use in the past month was a slightly better indicator of psychological distress compared to drunkenness in the past month.

In the case of externalising difficulties, the study shows a universal association with problematic social media use for both genders. The dissertation study shows that the prevalence of problematic social media use among Latvian adolescents is high and that it is more strongly associated with mental health difficulties than any substance-related high-risk behaviour.

Cyberbullying is one of the ways in which problematic social media use can contribute to externalising problems. Teenagers who engage in aggressive behaviour online, such as sending abusive messages or spreading rumours, may also experience increased levels of aggression and hostility offline. This double aggression can lead to discipline problems at school and strained relationships with peers and family members (Kowalski et al., 2014).

In addition, excessive social media use can promote impulsivity and reduce self-regulation. Constant exposure to highly stimulating and emotionally charged content on social media, combined with the immediacy of online interactions, can hinder an adolescent's ability to control impulses and make well-informed decisions (Odgers, 2018). This impulsivity can manifest offline as risky behaviour, defiance of authority and difficulties in following rules and norms. On the other hand, young people with existing externalising difficulties are characterised by impulsivity and a tendency to seek stimulating activities, which can predispose them to problematic use and potentially non-chemical dependence. The addictive nature of social media, with its constant external validation and rewarding of constant engagement, may lead these adolescents to spend an inordinate amount of time online seeking approval and social recognition. This in turn can exacerbate academic problems, as adolescents may

neglect schoolwork and extracurricular activities, contributing to their externalising difficulties (Vernon, Modecki, and Barber, 2017).

Research shows that social media also have a potentially positive impact on adolescents' mental health. If used thoughtfully and in moderation, social media can offer a number of benefits to teenagers. For example, social media platforms provide adolescents with the opportunity to connect with friends and peers, fostering a sense of belonging and social support that can be crucial to their emotional well-being (Primack et al., 2017). In addition, online mental health communities and awareness campaigns on platforms such as Instagram and X have reduced the stigma of mental health problems and provided valuable resources and peer support for adolescents experiencing mental health problems (Radovic et al., 2017). In addition, social networks can serve as an opportunity for creative expression, helping adolescents to build self-esteem and positive self-identity (Best, Manktelow, and Taylor, 2014). Overall, if used thoughtfully and positively, social media can contribute to improving adolescents' mental health by strengthening their sense of social belonging, awareness and opportunities for self-expression.

However, there are still significant evidence gaps in our understanding of the complex pathways by which social media exposure can harm or benefit brain development (The U.S. Surgeon General's Advisory, 2023).

The experience of bullying

The findings of the dissertation study support a well-described relationship in the literature between experiences of bullying and adolescent mental health difficulties (Li et al., 2022; Ye et al., 2023). The risks of both internalising and externalising difficulties are elevated for young people who engage in bullying; the risks are elevated for both sides, for young people who are victims of bullying and for those who themselves bully others, and the mental health risks associated with bullying online are not lower than those associated

with traditional bullying. However, data from the Latvian adolescent population also show differences in the severity of risks of mental health problems.

Latvian young people who are victims of bullying have significantly higher chances of internalising difficulties. This relationship has been replicated many times in studies around the world. In a recent meta-analysis of 85 studies with more than 100 000 participants, Stefanny and colleagues confirm a bidirectional association between victimisation and internalising difficulties in school-age children, with online victimisation showing a stronger association with internalisation than offline victimisation (Moore et al., 2017). In a meta-analysis of 165 studies by Moore and colleagues, experiences of bullying showed strong associations with a wide range of negative outcomes, including depression, anxiety, poor self-rated health, suicidal ideation and behaviour (Moore et al., 2017).

The mechanisms of this increased risk may be due to the social isolation and chronic stress experienced by victims of bullying. Persistent negative peer evaluations and physical or emotional harm by peers can undermine self-esteem and contribute to feelings of helplessness, contributing to symptoms of anxiety and depression (Arseneault, Bowes, and Shakoor, 2010). Furthermore, Copeland and colleagues found that the effects of teasing continue into adulthood for many victims, indicating the long-term negative impact of these experiences on mental health (Copeland et al., 2013).

On the other hand, bullying others (both in real life and in the e- environment) shows a stronger association with externalising difficulties in the dissertation study. Research has consistently shown a strong link between bullying others and externalising problems (Marciano, Schulz, and Camerini, 2020; Sigurdson, Kaasbøll, and Sund, 2021). Barker and colleagues (Barker et al., 2008) found that children who engaged in bullying behaviour were more likely than their peers to be impulsive, oppositional and disruptive. In addition,

the repetitive and aggressive nature of bullying behaviour may indicate difficulties in emotion regulation, empathy and social skills, which are also risk factors for externalising difficulties (Rigby, 2003). Results from a meta-analysis by Vrijen and colleagues indicate that bullying others during school age is strongly associated with externalising psychiatric disorders, such as substance use, in adulthood (Vrijen, Wiertsema, and Ackermans, 2021).

Spiritual well-being

The results of the dissertation study show a clear and differentiated relationship between different dimensions of spiritual well-being and mental health difficulties in Latvian adolescents. Young people with lower subjective salience of connectedness with others and connectedness with nature had significantly increased odds of externalising difficulties, while young people with lower subjective salience of connectedness with self had significantly increased odds of internalising difficulties. This finding fits well with the conceptual model of internalisation and externalisation as mechanisms of psychopathogenesis, where internalisation of distress is conceptualised as turning negative affect towards the self (projection into internal, intrapsychic space) and externalisation as turning negative affect towards others (projection into external, extrapsychic space).

Interestingly, the Latvian data show a significant negative correlation between the subjective salience of connectedness to the transcendent and mental difficulties in boys. Unlike other studies, where the correlation between the subjective salience of connectedness to the transcendent and mental health difficulties is not as strongly negative as in the Latvian adolescent data, there is a generally weak – sometimes small and statistically insignificant – but persistent negative trend in this domain if spirituality also in other studies (Michaelson et al., 2019). Similarly, a study of Czech adolescents found that those with higher spiritual well-being scores reported fewer health complaints, with the exception

of an increase in nervousness. This study used a spiritual well-being scale consisting of religious and existential well-being subscales. In-depth analysis revealed that religious well-being correlated with greater nervousness (Zidkova et al., 2020). Unfortunately, both the design of the dissertation study and the cross-sectional design of most studies published to date do not allow for conclusions about the direction of causality. It is possible that adolescents who have already experienced mental health problems experience a more pronounced identity crisis, which makes them more likely to reflect on the transcendent and the 'big questions of life' in search of answers, solace and belonging, also in the generally very secular peer environment of Latvia.

School environment and social support

The findings of this dissertation support the relationship identified in the literature between adolescents' subjective dissatisfaction with school, as well as increased subjectively experienced school pressure and mental health difficulties. Also in Latvia, both young people with internalising difficulties and young people with externalising difficulties are more likely than other peers to perceive the school environment as problematic. This universal finding may point to an insufficient capacity of the Latvian education system to include and provide the necessary support to young people with different types of mental (including emotional, behavioural and neurodevelopmental) difficulties. On the other hand, these data can be seen as an indication that the school environment and school-based mental health interventions are one of the most important, yet underused, resources for improving the mental health and well-being of Latvian adolescents.

Similar to school environment factors, family environment factors also show up as important. Low perceived family support was associated with increased odds of both internalising and externalising difficulties in the Latvian adolescent population, this association was stronger for internalising than for

externalising difficulties, and more pronounced for girls than for boys. This may be due to the different nature of internalising and externalising mechanisms of psychopathogenesis, as well as gender differences in the manifestations of psychological difficulties and the family environment's responses to them.

Internalising difficulties are characterised by directing negative affects inwards, which has a significant impact on the young person's emotional well-being and is often associated with subjective feelings of loneliness and lowered self-esteem, which in turn can lead the young person to perceive the family environment as less supportive. A meta-analysis by McLeod and colleagues looking at associations between parenting styles and anxiety found that child anxiety was more strongly associated with higher parental control than with parental rejection, but overall, this explained only a small part of the association between family environmental factors and anxiety. This suggests that it is with internalising difficulties that the young person's subjective perceptions play a relatively greater role. In addition, internalising difficulties are often less visible and may be more easily missed by family members, especially if family support structures are weak. Externalising behaviour, on the other hand, is more likely to attract the attention and involvement of family members and other adults, which may also affect the young person's subjectively experienced level of family support.

Research shows that girls and boys may experience distress differently – girls are more likely to use internalising distress-coping mechanisms (Achenbach et al., 2016). This tendency makes girls particularly sensitive to the quality of family relationships and support. Girls are often more likely than boys to seek and value emotional connection and communication within the family, which may make them more vulnerable to the negative effects of low family support.

Similar mechanisms may be at play in the case of low subjectively experienced support from friends, where the dissertation study data show

a relationship only with internalising but not externalising mental health difficulties for adolescents of both genders. In addition, research suggests that externalising behaviour may be perceived as socially desirable in adolescent peer environments. A meta-analysis by Hensum and colleagues shows that engaging in bullying and aggressive behaviour is associated with higher popularity among peers (Hensum et al., 2023). This finding is supported by the results of the Erdogan 2022 meta-analytic review (Erdogan, 2022). This highlights the importance of low subjectively experienced friend support, both as a potential risk factor for emotional difficulties and as a perpetuating mechanism for behavioural difficulties.

3.4 Strengths and limitations of the study

The main strengths of the study are its large, nationally representative sample, which allows conclusions to be drawn about the Latvian adolescent population aged 11–15 years, and the well-developed general population sampling strategy used by the HBSC, which significantly reduces the likelihood of systematic sampling error. However, as a limitation of the sampling process that potentially reduces the representativeness of the study, the sample by design (school-based study) did not include young people who, for various reasons, do not receive face-to-face education at school and systematically excluded young people attending special schools, including special primary education programmes for children with mental health disabilities. Also, despite the relatively high participation rate in the HBSC (74 %), there is potential for nonresponse bias, as young people who did not participate in the study could potentially have a different prevalence of emotional and behavioural difficulties and other health-related factors than those who agreed to participate and were included in the study.

The clinical study sample was by definition a convenience sample and therefore not representative of the entire Latvian clinical population, but the

design of the dissertation study was to use these data only to draw conclusions about the clinical utility of the SDQ self-report instrument.

Interpreting the results of a population study should take into account its several methodological limitations. The cross-sectional design of the study only allows conclusions to be drawn about the existence of an association between the factors under investigation but does not allow conclusions to be drawn about the direction of causality of the association found.

As can be seen from the analysis of the psychometric properties of the SDQ, its latent factor structure and scale reliability in Latvian general adolescents differed substantially from the original, so its findings should be interpreted with some caution, especially in the context of externalising difficulties.

Also, the HBSC survey questionnaire and the SDQ instrument are self-administered questionnaires, so several situational factors could have influenced respondents' answers: the young person's emotional state at the time of completion, cognitive maturity and ability to understand the question, as well as to interpret and name their internal states. In addition, completing the questionnaire during a lesson, in a classroom with peers, may indicate unconscious social pressure and increase the likelihood of giving socially desirable answers.

Another limitation is that the HBSC study by design does not include older adolescents (16–18 years) who, as previously shown, are a distinct group in terms of psychopathology risk (44). This limitation should be taken into account if our estimated norms are applied to older adolescents in future studies. In addition, the validity of our norms could be affected by the exclusion of special schools from the original HBSC sample. This could mean that adolescents with severe behavioural problems and other forms of mainly externalising psychopathology, who in Latvia are still sometimes educated in segregated special school settings, were selectively excluded from the normative sample.

In addition, the HBSC did not include other measures of internalising and externalising difficulties, so it was impossible to test the convergent or divergent validity of the SDQ in a general population sample of adolescents. In general, there is a lack of short psychological assessment instruments that would have been adequately validated in the Latvian population of children and adolescents, making the validation of new psychometric instruments rather problematic due to the lack of a "gold standard". Further research is needed on the construct validity of the SDQ self-report in the Latvian adolescent population, possibly using more structured diagnostic interviews, as has been done previously in the adult population.

Finally, this study calculated the relative norms for the SDQ subscales in a general population sample, indicating the relative position of the respondent in relation to peers. If the SDQ is to be used as a screening tool in a clinical setting, the convergent, divergent and clinical validity of the SDQ must first be established when applying the normative measures presented in this dissertation.

Conclusions

1. The Latvian adaptation of the SDQ adolescent self-report questionnaire generally shows sufficient internal validity to be used to draw conclusions about the prevalence of emotional and behavioural difficulties and their influencing factors in the general Latvian adolescent population. However, the factor structure of the Latvian and Russian versions of this psychometric instrument in the Latvian adolescent population is not in line with the original and cannot be improved without completely changing the structure of the survey items. In interpreting the screening results, the indicators for emotional problems, internalising difficulties and total difficulties can be relied on more confidently, while in the area of externalising difficulties, the SDQ adolescent self-report questionnaire results should be interpreted with some caution, and the results for conduct problems, hyperactivity and peer problems cannot be interpreted separately due to insufficient reliability of these subscales.

2. Internalising and externalising difficulties identified by the SDQ screening instrument have statistically significant correlations with clinically diagnosed mental disorders in the corresponding taxonomic group, but the sensitivity and specificity of this screening questionnaire, as well as other predictive properties, are not sufficient to make it useful for routine clinical practice. Adolescents from the clinical population sample show significantly higher mean scores on the emotional, peer problems and hyperactivity subscales of the SDQ than adolescents from the general population sample but show no significant differences in the prevalence of conduct problems and prosocial behaviour.

3. The prevalence of internalising and externalising difficulties in the Latvian adolescent population aged 11. 13 and 15 is high, with strong gender and weaker age effects. Internalising difficulties are generally less common in boys than in girls and decrease slightly with increasing age. For girls, on the other

hand, internalising difficulties increase markedly with age. Externalising difficulties are markedly more common in 11-year-old boys than in girls, but the prevalence of externalising difficulties evens out between the genders as age increases.

4. All the health-related factors studied show statistically significant associations with increased odds of internalising, externalising and total mental difficulties, but the importance of these factors varies for internalising and externalising difficulties and between genders.

In the case of total mental health difficulties, boys show the strongest association with alcohol and cannabis use and engaging in bullying others online. For girls, the strongest association is observed with multiple health complaints, problematic social media use, low perceived importance of relationship with self, low subjectively experienced family support, experiences of bullying at school and bullying others online, and high schoolwork pressure. For both genders, total mental health difficulties are associated with low self-rated health and low life satisfaction.

In the case of internalising difficulties, problematic social media use shows the strongest correlation for boys, while for girls, multiple health complaints, low perceived importance of relationship with self and experiences of bullying both online and offline. For both genders, internalising difficulties have a strong association with low self-rated health and low life satisfaction.

For girls, the most pronounced association of externalising difficulties is with low life satisfaction, smoking, alcohol use, low perceived importance of relationship with others. For both genders, externalising difficulties had a strong association with problematic social media use and bullying others, both online and offline.

List of publications and reports on the topic of the Thesis

Publications:

1. **Bezborodovs, Ņ.**, Krēgers, R., Vētra, L., Rancāns, E., Villeruša, A. 2023. Psychometric properties and normative data of the Latvian and Russian language versions of the Strengths and Difficulties Questionnaire (SDQ) in the Latvian general adolescent population. *Nordic Journal of Psychiatry.* 1–11. Advance online publication. doi: 10.1080/08039488.2024.2319662

2. **Bezborodovs, Ņ.**, Villeruša, A. 2023. Subjective health status, health behaviours and high-risk behaviours as risk factors for adolescent psychopathology. *SHS Web Conf.* 184 (2024). doi: 10.1051/shsconf/202418402002

3. **Bezborodovs, Ņ.**, Kočāne, A., Rancāns, E., Villeruša, A. 2022. Clinical Utility of the Parent-Report Version of the Strengths and Difficulties Questionnaire (SDQ) in Latvian Child and Adolescent Psychiatry Practice. *Medicina (Kaunas).* 58(11):1599. doi: 10.3390/medicina58111599

Presentations and abstracts:

1. **Bezborodovs, N.**, Krēgers, R., 2024. The reliability and factor structure of the Latvian and Russian versions of self-report Strengths and Difficulties Questionnaire (SDQ) in the Latvian general adolescent population. *26th World Congress of the International Association for Child and Adolescent Psychiatry and Allied Professions*. Abstract, e-publication.

2. **Bezborodovs, Ņ.**, Rancāns, E., Villerusa, A. 2023. Using the Strengths and Difficulties Questionnaire (SDQ) for mental health screening in a community sample of Latvian adolescents. *20th International Congress of the European Society for Child and Adolescent Psychiatry*. Abstract, e-publication.

3. **Bezborodovs, Ņ.**, Villerusa, A. 2023. Subjective health status, health behaviours and high-risk behaviours as risk factors for adolescent psychopathology. *RSU RW 2023 the 10th International Multidisciplinary Research Conference "Society. Health. Welfare."*. Abstract, Medicina (Kaunas), 59(Suppl.2), 792.

4. **Bezborodovs, Ņ.**, Kočāne, A., Miķelsons, G.R., Rancāns, E., Villerusa, A. 2023. Strengths and Difficulties Questionnaire (SDQ) as a mental health screening tool in general and clinical adolescent populations in Latvia. *RSU RW 2023 the 10th International Multidisciplinary Research Conference "Knowledge for use in practice"*. Abstract, *Medicina (Kaunas)*, 59(Suppl.2), 304.

5. **Bezborodovs, Ņ.**, Kočāne, A., Rancāns, E., Villerusa, A. 2023. Psychometric properties of the parent-report version of the Strengths and Difficulties Questionnaire (SDQ) in a clinical population of Latvian children and adolescents. *31st European Congress of Psychiatry*. Paris, France, 25/03/23–28/03/23. S421–S422.

6. **Bezborodovs, N.**, Zarde, I., Pudule, I., Villerusa, A. 2021. Association of self-rated health, life satisfaction and mental health difficulties in Latvian adolescents. *RSU RW*

2021 the 8th International Multidisciplinary Research Conference "Society. Health. Welfare.". Abstract, 45.

7. Kocane, A., **Bezborodovs, Ņ.** 2021. Parent and adolescent reports on emotional and peer problems in psychiatric outpatient setting using SDQ. *29th European Congress of Psychiatry*. Abstract, European Psychiatry, 64 (Supplement 1), S230. https://doi.org/10.1192/j.eurpsy.2021.616

8. Kočāne, A., **Bezborodovs, Ņ.** 2021. Developmental Affective Psychopathology (Mood/Anxiety Disorders in Children/Adolescents) Parent and Adolescent Reports on Emotional and Peer Problems in Psychiatric Outpatient Setting. *11th Conference of the International Society for Affective Disorders*. 3/11/21–4/11/21. 54–55.

9. Kočāne, A., **Bezborodovs, Ņ.** 2021. Parent reports on internalizing difficulties in child-adolescent psychiatric outpatient setting using Strengths and Difficulties Questionnaire and their relation to clinical diagnosis. *RSU RW 2021 International Research Conference on Medical and Health Care Sciences "Knowledge for Use in Practice"*. Abstract, 189.

10. Zarde, I., Ivanovs, R., **Bezborodovs, Ņ.** 2021. Association of somatic complaints and externalizing/internalizing mental health difficulties in Latvian adolescents. *79th International Scientific Conference of the University of Latvia – International Scientific Conference on Medicine. Abstract. Medicina (Kaunas) 2021;57(Supplement 1)*:68

11. Kocane, A., **Bezborodovs, N.** 2021. Parent reports on externalizing difficulties in child-adolescent psychiatric outpatient setting using SDQ and their relation to clinical diagnosis. *79th International Scientific Conference of the University of Latvia – International Scientific Conference on Medicine. Abstract. Medicina (Kaunas) 2021;57(Supplement 1):*76

12. **Bezborodovs, N.**, Pudule, I., Villerusa, A. 2020. Prevalence of self-reported emotional and behavioural problems in Latvian adolescents. *24th World Congress of the International Association for Child and Adolescent Psychiatry and Allied Professions.* Abstract, e-publication

13. **Bezborodovs, N.**, Rancans, E., Villerusa, A. 2019. Screening for Symptoms of Psychological distress in adolescent Populations. *Rīga Stradiņš University International Conference on Medical and Health Care Sciences Knowledge for Use in Practice.* 291.

14. **Bezborodovs, N.**, Villerusa, A. 2018. Prevalence and socio-demographic determinants of high-risk behaviours among 15-year-old adolescents in Latvia. *32nd Nordic Congress of Psychiatry.* Abstract, e-publication.

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Other types of publications:

1. Pudule, I., Velika, B., Grīnberga, D., Gobiņa, I., Villeruša, A., Kļaviņa-Makrecka, S., **Bezborodovs, Ņ.** 2020. Survey results and trends of Latvian schoolchildren's health habits for the school year 2017/2018. Centre for Disease Prevention and Control.

Student reports and abstracts:

1. Liepa, D. E., Tolmane, T. G., Pirksta, I., **Bezborodovs, Ņ.** 2020. Prevalence of externalizing behaviour among children and adolescents receiving inpatient psychiatric treatment. *RSU International student conference "Health and Social Sciences"*. 167.

2. Tolmane, T. G., Liepa, D. E., **Bezborodovs, Ņ.** 2020. Internalization in children and adolescents receiving inpatient psychiatric care – prevalence and possible contributing factors. *RSU International student conference "Health and Social Sciences"*. 159.

3. Liepa, D. E., Tolmane, T. G., **Bezborodovs, Ņ.** 2019. Expression of externalizing problems and its affecting factors in children and adolescents who are stationed in clinic of pediatric psychiatry. *International Children's health day – II Student's scientific conference in pediatrics*. 13.

4. Tolmane, T. G., Liepa, D. E., **Bezborodovs, Ņ.** 2019. Prevalence of internalizing symptoms in children and adolescents receiving inpatient psychiatric care. *International Children's health day – II Student's scientific conference in pediatrics. 14.*

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7. Bezborodovs, Ņikita, Arta Kočāne, Elmārs Rancāns, and Anita Villeruša. 2022. Clinical Utility of the Parent-Report Version of the Strengths and Difficulties Questionnaire (SDQ) in Latvian Child and Adolescent Psychiatry Practice. *Medicina* 58(11):1599. doi: 10.3390/medicina58111599.

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Annexes

Decision No 85/21.12.2017 of the Ethics Committee of Rīga Stradiņš University

Veidlapa Nr. E-9 (2)

RSU ĒTIKAS KOMITEJAS LĒMUMS NR. 85 / 21.12.2017.

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Iesniegšanas datums: 21.12.2017.

Pētījuma protokols: Izskatot augstāk minētā pētījuma pieteikuma materiālus (protokolu) ir redzams, ka pētījuma mērķis tiek sasniegts veicot klīniskās populācijas izpēti (datu vākšanu, apstrādi) un pacientu/dalībnieku aptauju-anketēšanu, iegūto datu apstrādi un analīzi, kā arī izsakot priekšlikumus. Personu (pacientu, dalībnieku) datu aizsardzība, informēta brīvprātīga (arī bērnu likumīgo pārstāvju) piedalīšanās un konfidencialitāte ir ievērota un nodrošināta. Līdz ar to pieteikums atbilst pētījuma ētikas prasībām.

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Ētikas komitejas sēdes datums: 21.12.2017.

Annex 2

Mean values of scales and subscales of the Russian version of the SDQ self-report questionnaire for the general Latvian adolescent population in gender and age groups

SDQ scale	Gender	Russian version of the SDQ								
		11 years			13 years			15 years		
		Mean	SD	CI 95 %	Mean	SD	CI 95 %	Mean	SD	CI 95 %
Emotional problems	Boys	2.82	2.28	(2.48–316)	2.71	2.24	(2.39–3.02)	2.6	2.27	(2.27–2.93)
	Girls	3.04	2.35	(2.70–3.38)	3.96	2.61	(3.59–4.34)	4.74	2.52	(4.38–5.09)
Conduct problems	Boys	2.91	1.91	(2.63–3.20)	3.16	1.75	(2.92–3.41)	3.25	1.51	(3.03–3.47)
	Girls	2.7	1.57	(2.48–2.93)	3.04	1.77	(2.78–3.29)	3.27	1.68	(3.03–3.50)
Hyper-activity	Boys	3.79	2.02	(3.49–4.09)	3.86	2.11	(3.56–4.15)	3.74	2.07	(3.44–4.04)
	Girls	3.73	2.2	(3.41–4.04)	3.95	2.05	(3.65–4.24)	4.06	2.18	(3.76–4.36)
Peer problems	Boys	3.71	1.95	(3.42–4.00)	3.2	1.8	(2.95–3.45)	3.11	1.85	(2.84–3.38)
	Girls	3.06	1.9	(2.79–3.34)	2.91	1.98	(2.63–3.19)	3.08	1.84	(2.82–3.34)
Prosocial behaviour	Boys	6.96	2.33	(6.61–7.31)	6.71	2.15	(6.41–7.01)	6.31	2.32	(5.97–6.64)
	Girls	7.47	1.97	(7.19–7.76)	7.19	1.99	(6.90–7.47)	7.1	2.22	(6.79–7.41)
Internalising difficulties	Boys	6.53	3.5	(6.00–7.05)	5.91	3.51	(5.42–6.40)	5.72	3.31	(5.23–6.20)
	Girls	6.11	3.59	(5.59–6.63)	6.87	3.8	(6.33–7.42)	7.82	3.63	(7.31–8.32)
Externalising difficulties	Boys	6.71	3.22	(6.23–7.19)	7.02	3.23	(6.57–7.47)	6.98	2.82	(6.57–7.39)
	Girls	6.43	3.12	(5.98–6.88)	6.98	3.12	(6.54–7.43)	7.33	3.23	(6.87–7.78)
Total difficulties	Boys	13.23	5.89	(12.36–14.11)	12.93	5.85	(12.11–18.75)	12.7	5.01	(11.97–13.43)
	Girls	12.54	5.74	(11.71–13.37)	13.86	5.88	(13.01–14.70)	15.14	5.37	(14.39–15.89)

Annex 3

Mean values of scales and subscales of the Latvian version of the SDQ self-report questionnaire for the general Latvian adolescent population by gender and age groups

SDQ scale	Gender	Latvian version of the SDQ								
		11 years			13 years			15 years		
		Mean	SD	CI 95 %	Mean	SD	CI 95 %	Mean	SD	CI 95 %
Emotional problems	Boys	3.11	2.19	(2.89–3.32)	2.84	2.17	(2.63–3.05)	2.72	2.08	(2.50–2.93)
	Girls	3.38	2.34	(3.16–3.60)	3.92	2.5	(3.69–4.16)	4.46	2.41	(4.22–4.71)
Conduct problems	Boys	3.56	1.86	(3.38–3.75)	3.58	1.7	(3.41–3.75)	3.54	1.7	(3.37–3.71)
	Girls	3.13	1.74	(2.97–3.30)	3.28	1.72	(3.11–3.44)	3.19	1.62	(3.03–3.36)
Hyper-activity	Boys	4.62	1.84	(4.44–4.80)	4.68	1.89	(4.50–4.86)	4.73	2.04	(4.52–4.93)
	Girls	4.30	1.91	(4.12–4.48)	4.52	2	(4.33–4.71)	4.55	1.93	(4.35–4.74)
Peer problems	Boys	3.27	1.94	(3.08–3.46)	3.13	2.05	(2.93–3.33)	2.98	1.89	(2.79–3.17)
	Girls	3.14	1.98	(2.95–3.32)	2.96	1.96	(2.77–3.14)	2.91	1.92	(2.71–3.10)
Prosocial behaviour	Boys	6.67	2.04	(6.47–6.86)	6.32	2	(6.13–6.52)	6.36	1.94	(6.17–6.56)
	Girls	7.40	1.90	(7.22–7.58)	7.19	1.94	(7.01–7.38)	7.1	2	(6.89–7.30)
Internalising difficulties	Boys	6.38	3.54	(6.03–6.72)	5.97	3.58	(5.62–6.32)	5.69	3.35	(5.36–6.03)
	Girls	6.25	3.55	(6.19–6.85)	6.88	3.62	(6.54–7.22)	7.37	3.64	(7.00–7.74)
Externalising difficulties	Boys	8.18	3.01	(7.89–8.48)	8.26	2.89	(7.98–8.54)	8.27	3.02	(7.96–8.57)
	Girls	7.44	3.03	(7.15–7.72)	7.8	3.02	(7.51–8.08)	7.74	2.91	(7.45–8.03)
Total difficulties	Boys	14.56	5.57	(14.02–15.10)	14.23	5.29	(13.71–14.75)	13.96	5.14	(13.44–14.48)
	Girls	13.96	5.5	(13.44–14.47)	14.68	5.28	(14.18–15.18)	15.11	4.95	(14.61–15.61)

Annex 4

Distribution of values of the Russian and Latvian language versions of the SDQ subscales and scales to percentile ranks based on a normative Latvian adolescent sample

	Emotional		Conduct		Hyper-activity		Peer		Prosocial			Inter-nalising		Exter-nalising			Total	
Raw score	**LV**	**RU**	**LV**	**RU**	**LV**	**RU**	**LV**	**RU**	**LV**	**RU**	**Raw score**	**LV**	**RU**	**LV**	**RU**	**Raw score**	**LV**	**RU**
0	11	14	2	5	1	5	7	6	1	1	**0–4**	34	34	14	23	**0–15**	65	66
1	24	28	13	17	5	14	23	21	1	2	**5**	43	44	21	33	**16**	72	72
2	40	44	33	40	15	27	43	40	2	3	**6**	54	55	32	45	**17**	77	77
3	55	57	56	62	29	43	63	57	5	7	**7**	63	65	45	59	**18**	83	80
4	69	70	75	82	48	62	77	75	11	12	**8**	72	72	58	70	**19**	87	85
5	81	82	88	92	69	79	88	88	26	24	**9**	79	79	71	79	**20**	91	89
6	89	88	95	96	85	89	94	95	43	39	**10**	87	86	82	89	**21**	93	91
7	94	93	98	98	93	95	97	98	60	57	**11**	91	90	88	92	**22**	95	94
8	97	96	100	100	97	98	99	100	77	74	**12**	94	93	93	95	**23**	96	95
9	99	99	100	100	100	99	100	100	91	87	**13**	96	96	96	97	**24**	97	96
10	100	100	100	100	100	100	100	100	100	100	**14–20**	100	100	100	100	**25–40**	100	100

LV – Latvian SDQ launguage version; RU – krievu SDQ launguage version.

Bandings of raw scores of the Russian and Latvian language versions of the SDQ with the application of the banding scores over the 80th and the 90th percentiles

SDQ scales	Latvian						Russian					
	Normal		Borderline		Abnormal		Normal		Borderline		Abnormal	
	Scores	% of cases	Scores	% of cases	Scores	% of cases	Scores	% of cases	Scores	% of cases	Scores	% of cases
Emotional symptoms	**0–5**	81.2	**6–7**	12.7	**8–10**	6.1	**0–5**	81.7	**6**	11.0	**7–10**	7.3
Conduct problems	**0–5**	88.1	**6**	7.0	**7–10**	5.0	**0–4**	81.6	**5**	10.0	**6–10**	8.3
Hyperactivity	**0–6**	85.4	**7**	7.8	**8–10**	6.8	**0–6**	89.1	**7**	6.1	**8–10**	4.7
Peer problems	**0–5**	88.4	**6**	5.8	**7–10**	5.9	**0–5**	88.1	**6**	7.2	**7–10**	4.7
Prosocial behaviour	**5–10**	88.7	**4**	6.1	**0–3**	5.1	**5–10**	87.8	**4**	5.6	**0–3**	6.7
Internalising	**0–10**	86.7	**11**	4.1	**12–20**	9.2	**0–10**	85.7	**11–12**	7.6	**12–20**	6.7
Externalising	**0–10**	81.6	**11–12**	11.1	**13–20**	7.3	**0–10**	88.5	**11**	3.8	**12–20**	7.7
Total difficulties score	**0–19**	82.6	**20–21**	8.0	**22–40**	9.4	**0–18**	80.4	**19–21**	10.8	**22–40**	8.7

Predictive properties of the SDQ self-administered questionnaire in a clinical adolescent population

SDQ	n	TN %	TP %	FN %	FP %	Sig	Sen %	Rev %	Spe %	PPV %	NPV %	LHR^{+}	LHR-	OR^{D}
Any emotional disorder														
Emotional	198	54.9	73.8	45.1	26.2	0.000	66	–	64	74	55	1.83	0.53	3.44
Peer	200	43.0	67.3	57.0	32.7	0.198	28	72	80	67	43	1.4	0.9	1.56
Hyperactivity	201	38.3	44.1	61.7	55.9	0.058	13	87	77	44	38	0.56	1.13	0.49
Conduct	203	42.2	60.7	57.8	39.3	0.709	29	71	74	61	42	1.09	0.97	1.13
Non-prosocial	204	41.2	59.3	58.8	40.7	0.961	13	87	87	59	41	1.02	1	1.02
Internalising	193	51.4	76.7	48.6	23.3	0.000	56	–	73	77	51	2.1	0.6	3.49
Externalising	198	41.5	58.9	58.5	41.1	0.951	28	72	72	59	42	1.01	0.99	1.02
Total difficulties	190	48.2	72.5	51.8	27.5	0.004	50	–	71	73	48	1.72	0.7	2.45
Any conduct disorder														
Emotional	198	67.0	14.0	33.0	86.0	0.002	33	67	40	14	67	0.55	1.67	0.33
Peer	200	74.8	16.3	25.2	83.7	0.201	17	–	73	16	75	0.65	1.13	0.58
Hyperactivity	201	80.8	44.1	19.2	55.9	0.002	32	–	88	44	81	2.59	0.78	3.33
Conduct	203	78.9	26.8	21.1	73.2	0.386	33	–	74	27	79	1.25	0.91	1.37
Non-prosocial	204	76.8	22.2	23.2	77.8	0.914	13	–	87	22	77	0.95	1.01	0.95
Internalising	193	71.0	14.0	29.0	86.0	0.013	28	72	51	14	71	0.57	1.42	0.4
Externalising	198	80.3	30.4	19.7	69.6	0.108	38	–	75	30	80	1.48	0.84	1.77
Total difficulties	190	72.7	16.3	27.3	83.8	0.073	30	70	54	16	73	0.66	1.28	0.52