Journal of Health Monitoring

The World Health Organization's Health Behaviour in School-aged Children (HBSC) Study – Survey Results from Germany 2017/18
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The World Health Organization’s Health Behaviour in School-aged Children (HBSC) Study – Survey Results from Germany 2017/18

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A study reaches maturity. 25 years of the HBSC study in Germany

Countless scientific and practical texts have been written about the importance of the health of children and adolescents to both individuals and society. Above all, these texts indicate that childhood and adolescence have long since ceased to symbolise health impairments or a lack of illness. Scientific research in this field aims to detect trends in health developments and to identify target groups for disease prevention and health-promoting measures. Combined with the Robert Koch Institute’s German Health Interview and Examination Survey for Children and Adolescents (KiGGS), the Health Behaviour in School-aged Children (HBSC) study provides the most comprehensive data pool for health reporting and the elaboration and detailed development of preventive measures for this age group in Germany [1]. The differences between the studies in terms of their methodological approach and contextual embedding – the KiGGS study has a national focus and accesses its sample via official residency registries, whereas the HBSC study is embedded at the international level under the patronage of the World Health Organization WHO (with the opportunities for international comparisons that this provides) and accesses data via schools and school classes – mean that the studies complement one another perfectly. For many years, this has led to fruitful, in-depth partnerships ranging from validation studies and joint publications to the establishment of working groups as part of professional scientific organisations.

The German HBSC study is due to mark an important anniversary during the current study cycle: the study will soon be 25 years old and, therefore, is slowly but surely reaching maturity. Since 1982, the HBSC study has been conducted every four years in an increasing number of countries [2]. Germany has participated in the study since 1994 when it was represented by the federal state of North Rhine-Westphalia. However, the 1993/94 cycle was a preliminary study, as Germany had not yet become an official member of the WHO research network [3]. Since then, Germany has participated in seven cycles of the study, which is unique throughout the world and currently covers almost 50 countries. As such, the HBSC study constitutes a key point of reference in international comparative child and adolescent health research. The founders of the study in the early 1980s had truly visionary ideas, and they certainly deserve the greatest respect.

The HBSC study has accompanied a large part of its members’ professional lives, and continues to do so; once you join the study, it is very difficult to let go. Staff turnover has therefore been remarkably low over the years. I can certainly vouch for that; in 1999, I started my first job as a student assistant at Bielefeld School of Public Health under the direction of Professor Klaus Hurrelmann. I was tasked with processing the HBSC data and the results for that year’s international report for the WHO [4]. 21 years later, it is both an honour and a duty to be able to coordinate the study for Germany, with a total of seven study sites.
Sustainability is a key challenge facing any scientific venture. This perhaps applies even more strongly to studies of adolescent health and health behaviour than to studies undertaken in the material or natural sciences, because funding relies more on political trends and the current zeitgeist. In 2004, the main headline from the HBSC study – that young people from Germany were top of the league in terms of smoking – generated a huge amount of interest among media and politics [5]. These days, however, this issue only ever generates marginal interest among politicians and funders because tobacco use has declined significantly in recent years. This, of course, represents a huge success story for disease prevention. However, the fact that this study can still be carried out at all in Germany is particularly impressive. With the exception of a small number of additional samples from the federal-state level, the nationwide HBSC study is self-financed by participating universities and endures solely through the passion and enthusiasm of the researchers involved in the network.

Time and again, the emergence of new health challenges has meant that the health of children and adolescents needs to be placed higher on the scientific, media and political agenda. The numerous and diverse publications and reports derived from the HBSC study, in addition to this issue of the Journal of Health Monitoring, are demonstrative of the high regard in which the HBSC study has been and continues to be held for public health research and practices. Scientific endeavours in this context are aimed at reducing the health impairments faced by children and adolescents, and at promoting their health. Importantly, the HBSC study provides extensive and robust evidence with which to do so and highlights the areas and contexts most in need of action. Moreover, all of this is achieved without external funding and the study results continue to be made freely available... here’s to the next 25 years!

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Subjective health and well-being of children and adolescents in Germany – Cross-sectional results of the 2017/18 HBSC study

Abstract

Subjective health is understood as a multidimensional construct that encompasses the physical, mental and social dimensions of a person’s well-being. Promoting the subjective health and well-being of children and adolescents has strong public health relevance because health impairments in childhood and adolescence are often associated with long-term health problems in adulthood. Therefore, it is very important to gain information about potential risk and resource factors involved. This article presents current prevalences for subjective health, life satisfaction and psychosomatic health complaints among children and adolescents in Germany aged 11, 13 and 15 years from the 2017/18 Health Behaviour in School-Aged Children (HBSC) study (N=4,347, 53.0% girls). It also examines the sociodemographic and psychosocial factors that influence subjective well-being. Most children and adolescents provided positive ratings of their health and life satisfaction. Nevertheless, about one third of girls and one fifth of boys were affected by multiple psychosomatic health complaints. Impairments in subjective well-being were particularly evident in girls, older adolescents, young people with low levels of family affluence and those under a lot of pressure at school. In contrast, high family support was associated with better subjective well-being. These results illustrate the need for target group-specific prevention and health promotion measures aimed at improving the subjective health and well-being of children and adolescents.

1. Introduction

Subjective health and well-being are important resources in childhood and adolescence and are target criteria for a variety of measures in disease prevention and health promotion. For example, the World Health Organization’s (WHO) Health 2020 policy framework defines early and targeted promotion of well-being as a central strategy that contributes to the healthy development of children and future generations [1]. Regular measurements of subjective health and well-being by population-based surveys, therefore, play an essential role in continuous health monitoring and provide a foundation on which to plan targeted prevention and health promotion measures [2, 3]. The HBSC (Health Behaviour in School-aged Children) study and KiGGS study (German Health Interview and Examination Survey for Children and Adolescents) are suitable monitoring instruments that provide important information on the subjective health and well-being of children and adolescents in Germany.
The WHO [4] defines health as a state of complete physical, mental and social well-being. Health and well-being are mutually dependent and subject to common determinants (and these terms are often used interchangeably) [5]. The WHO definition underlines the subjective character of well-being and points to its multidimensionality. Subjective well-being is related to people’s individual living conditions and experiences [6]. In the literature, the subjective assessment of one’s own health, life satisfaction (i.e. the evaluation of one’s life), as well as psychosomatic and physical health complaints are often used as central indicators of subjective well-being [7, 8].

Studies have shown that health and well-being are important resources in childhood and adolescence and that health impairments during this phase of life are associated with long-term health problems in adulthood [9, 10]. Numerous studies demonstrate subjective health to be a reliable predictor of physical and mental illnesses in later life, the future uptake of health services as well as mortality [11–13]. Subjective health and well-being are influenced by numerous psychosocial factors. Particular importance is attached to school-related influencing factors, as young people spend a large amount of their time in school where they often come under a lot of pressure [9, 14]. For example, results from the international HBSC study demonstrate pressure at school and (cyber)bullying to be among the main risk factors associated with psychosomatic complaints [18, 19], self-rated health [15, 16] and life satisfaction [17] among schoolchildren. In addition, risk behaviours such as smoking [20] and excessive media use [21] are linked to greater burdens on subjective health. In contrast, psychosocial resources at school (e.g. a good school environment) and in the family (e.g. family support) have a positive effect on children’s and adolescents’ life satisfaction [22, 23].

In addition to these psychosocial risk factors and resources, subjective well-being is strongly associated with sociodemographic factors such as sex, age and socioeconomic status (SES). In general, girls report impairments in their subjective well-being more often than boys and this is also the case with older compared to younger adolescents [24, 25]. In addition, low SES is often linked to poorer health in childhood and adolescence [25]. International findings from the HBSC study demonstrate significant social inequalities in various areas of subjective health among children and adolescents in almost all European countries, and these inequalities have remained largely constant over the past few years [26–30]. There are also signs that children and adolescents with a migration background differ from those with a non-migration background in terms of their health status and health behaviour. However, migration status can be associated with favourable or adverse effects on various health indicators [31].

Against this background, this article presents current prevalences from the HBSC study on self-rated health, life satisfaction and psychosomatic health complaints for 11-, 13- and 15-year-old children and adolescents in Germany. It also examines the relationship between an overall index that reflects subjective well-being as a multidimensional construct and i) sociodemographic factors (sex, age, family affluence and migration status) and ii) psychosocial factors (school pressure and family support).
2. Methods
2.1 Sample design and study implementation

The analyses presented here are based on data from the HBSC study that were collected in Germany in 2018. The international HBSC study aims to gather comprehensive data on young people’s health and health behaviour. An internationally binding research protocol was drawn up to ensure that the HBSC study was implemented in a standardised manner. Sampling was carried out using a random selection from the combined population of all fifth, seventh and ninth grade school pupils in accordance with the percentage distribution of each school type in each German federal state. An internationally standardised core questionnaire was used for data collection and the pupils completed the questionnaire in class. Children and adolescents were only permitted to take part if both they and their parents provided written informed consent on the day of the survey. Participation in the study was voluntary. The data protection officer at Martin Luther University Halle-Wittenberg and the Ethics Committee of the General Medical Council Hamburg provided expert advice and approved the study. In addition, the ministries of culture and education from all federal states provided advance permission to conduct the study. A detailed description of the methodology applied by the HBSC study can be found in Moor et al. in this issue of the Journal of Health Monitoring.

2.2 Instruments

Indicators of subjective health and well-being

Data on self-rated health were collected using the question: ‘Would you say your health is ...?’, with the option to choose from the following responses: ‘excellent’, ‘good’, ‘fair’ and ‘poor’. The categories ‘excellent’ and ‘good’ were combined into ‘excellent/good’ health and the categories ‘fair’ and ‘poor’ into ‘rather poor’ health. Life satisfaction was measured using the Cantril Ladder [32]. The participants were asked to use an eleven-point visual analogue scale in the form of a ladder to indicate their current life satisfaction. The upper end of the ladder stood for the ‘best possible life’ (ten points); the lower end for the ‘worst possible life’ (zero points). Their answers were divided into two groups: ‘low life satisfaction’ (zero to five points) and ‘medium to high life satisfaction’ (six to ten points). Data on psychosomatic health complaints were collected using the HBSC Symptom Checklist (HBSC-SCL) [33]. The participants were provided with a five-point answer scale ranging from ‘about every day’ to ‘rarely or never’ to indicate how often they had suffered from headache, stomach ache, backache, feeling low, irritability, nervousness, sleeping difficulties and dizziness during the past six months. The term ‘multiple psychosomatic complaints’ was used if two or more of these complaints occurred at least once a week. The three indicators – self-rated health, life satisfaction and psychosomatic health complaints – were then combined to form an overall index, which is defined in this article as subjective well-being (answers were divided into two groups: ‘very good/good’ and ‘rather poor’) [24]. Subjective well-being was described as ‘very good/good’ if a participant rated...
their health as excellent or good, demonstrated medium to high life satisfaction (six or more points) and suffered from fewer than two psychosomatic complaints each week.

**Psychosocial factors**

The pressure faced by young people at school was measured by asking: ‘How pressured do you feel by the schoolwork you have to do?’, with the option to choose from the following responses: ‘not at all’, ‘a little’, ‘some’ and ‘a lot’ [9]. The categories ‘not at all’ and ‘a little’ were combined to form the category ‘rather low’, whereas ‘some’ and ‘a lot’ were consolidated as ‘rather high’ school pressure. Data on family support were collected using a subscale derived from the Multidimensional Scale of Perceived Social Support (MSPSS) [36]. This subscale comprises four items and enables data to be collected on the subjective emotional support provided by a family (e.g. ‘I can talk about my problems with my family’). Participants rated the statements using a seven-point scale ranging from ‘very strongly disagree’ to ‘very strongly agree’. In line with the recommendations made by the HBSC study [9], the total score determined from the ratings was divided using a cut-off (≥ 5.5) and the adolescents were assigned to one of two groups: ‘low family support’ and ‘high family support’.

**Sociodemographic factors**

Data on sex was collected using the question ‘Are you a boy or a girl?’. Age was measured using two questions about the participants’ month and year of birth. The participants were divided into three age groups (11 years, 13 years and 15 years), which largely correspond to the fifth, seventh and ninth grades of the German school system. The Family Affluence Scale (FAS) [34, 35] was used to collect data about the material wealth found in the participants’ homes (computers, cars, their own room, holidays, bathrooms, dishwashers). A cumulative index was formed from these six items and converted using a RIDIT (Relative to an Identified Distribution Integral Transformation) analysis to divide the young people into three groups based on a quintile division of lower (< 20%), medium (20% to 80%) and high (> 80%) family affluence. The participants’ migration status was operationalised using questions about their country of birth and that/those of their parents. Adolescents with one parent born outside of Germany are categorised as having a one-sided migration background. A two-sided migration background was present if a) the adolescent itself was not born in Germany and at least one parent was not born in Germany or b) both parents had moved to Germany and were not born in Germany.

The sample was analysed by calculating absolute and relative frequencies for the independent variables. The prevalences of excellent or good self-rated health, medium to high life satisfaction and multiple psychosomatic complaints were then stratified by age and sex. Prevalences were calculated using a weighting factor that corrected for deviations within the sample from the population structure with regard to school type, age and sex. Multiple logistic regression analysis was used to examine the relationships...
Most children and adolescents rate their health as excellent or good and report medium to high life satisfaction.

between the overall index of subjective well-being and the selected sociodemographic factors (sex, age, family affluence and migration status) and psychosocial factors (school pressure and family support). A statistically significant difference between groups was assumed to have been identified with significance levels of $p < 0.05$. All analyses were carried out using IBM’s SPSS package (version 26).

3. Results

A total of $N=4,347$ pupils in the fifth, seventh and ninth grades aged 11 years, 13 years and 15 years took part in the survey (53.0% girls). The quintile classification resulted in almost two thirds of young people being categorised as of medium family affluence (65.7%), with almost one fifth of the respondents as low (18.2%) or high (16.0%) family affluence. About two thirds of the adolescents had no migration background (64.7%). A quarter of the participants (25.1%) felt under some or a lot of pressure at school. The majority of young people (74.0%) reported a high level of family support. Further descriptions of the study population can be found in the article by Moor et al. in this issue of the Journal of Health Monitoring.

Self-rated health

Figure 1 depicts the proportion of children and adolescents by age and sex that rated their health as excellent or good. The majority of respondents (88.9%) reported excellent or good health. A significantly higher proportion of boys (90.4%) than girls (87.3%) were positive about their health. Positive health ratings decreased with age among both sexes, whereby the decrease was significantly more pronounced among girls (-11.5 percentage points) than among boys (-4.0 percentage points).

Life satisfaction

Differences by sex were also evident in assessments of life satisfaction (Figure 2). The majority of young people (88.7%) rated their life satisfaction as medium to high, whereby boys (91.6%) provided a significantly more positive rating of their life satisfaction than girls (85.9%). Whereas the proportion of boys with medium to high life satisfaction changed very little over time and even increased slightly between the ages of 13 and 15, the proportion of girls who reported medium to high life satisfaction decreased significantly among the older age groups (-7.4 percentage points).
Prevalence of medium to high life satisfaction (six or more points) by sex and age (n=2,153 girls, n=2,145 boys)
Source: 2017/18 German HBSC study

Overall index of subjective well-being
66.1% of children and adolescents reported a good level of subjective well-being – defined as excellent or good self-rated health combined with medium to high life satisfaction and fewer than two weekly psychosomatic complaints. Table 1 shows the results of the multivariate logistic regression analysis and demonstrates that girls reported significantly lower levels of subjective well-being than boys, as did older adolescents (15 years) compared to younger people (11 years). Participants with medium or low family affluence also reported significantly lower levels of subjective well-being compared to those with high family affluence. No association was identified between subjective well-being and migration status. With regard to pressure at school, pupils who felt rather high pressure at school reported significantly lower levels of subjective well-being.

About one third of girls and one fifth of boys suffer from multiple psychosomatic health complaints.

Psychosomatic health complaints
Figure 3 sets out the age and sex-specific proportion of children and adolescents who reported having at least two weekly psychosomatic complaints in the past six months. 26.9% of respondents reported multiple psychosomatic complaints, with girls reporting them significantly more often (34.2%) than boys (19.7%). This significant difference by sex was observed in all age categories and increased among older age groups. However, the frequency of multiple psychosomatic complaints among girls increased significantly with age (+16.4 percentage points), whereas the proportion among boys increased only slightly (+4.5 percentage points).
Subjective health and well-being of children and adolescents in Germany

Impairments in subjective well-being are particularly evident in girls, older adolescents, and young people with low family affluence or those under a lot of pressure at school.

Table 1
Multivariate logistic regression to predict the subjective well-being of children and adolescents (n=2,058 girls, n=1,740 boys)
Source: 2017/18 German HBSC study

<table>
<thead>
<tr>
<th>Source: 2017/18 German HBSC study</th>
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<table>
<thead>
<tr>
<th>Sex</th>
<th>OR</th>
<th>(95%-CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys (reference)</td>
<td>0.53</td>
<td>(0.46–0.61)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Age group</th>
<th>OR</th>
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<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 years (reference)</td>
<td>0.90</td>
<td>(0.74–1.08)</td>
<td>0.236</td>
</tr>
<tr>
<td>13 years</td>
<td>0.70</td>
<td>(0.59–0.83)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>15 years</td>
<td></td>
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<table>
<thead>
<tr>
<th>Family affluence</th>
<th>OR</th>
<th>(95%-CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (reference)</td>
<td>0.61</td>
<td>(0.48–0.79)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Medium</td>
<td>0.79</td>
<td>(0.65–0.97)</td>
<td>0.022</td>
</tr>
<tr>
<td>Low</td>
<td></td>
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</tbody>
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<tr>
<th>Migration status</th>
<th>OR</th>
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<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (reference)</td>
<td>0.93</td>
<td>(0.75–1.16)</td>
<td>0.522</td>
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<tr>
<td>One-sided</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Two-sided</td>
<td>0.86</td>
<td>(0.72–0.97)</td>
<td>0.090</td>
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<table>
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<th>School pressure</th>
<th>OR</th>
<th>(95%-CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
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<td>Rather low (reference)</td>
<td>0.65</td>
<td>(0.55–0.76)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Rather high</td>
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<table>
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<th>Family support</th>
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<td>Low (reference)</td>
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<td>(2.54–3.56)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>High</td>
<td></td>
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OR = odds ratio, CI = confidence interval
Bold = statistically significant in comparison to the reference group (p < 0.05)

4. Discussion

This article reports current prevalences for self-rated health, life satisfaction and psychosomatic health complaints for 11-, 13- and 15-year-old children and adolescents in Germany and examines the associations between an overall index of subjective well-being and sociodemographic and psychosocial factors. The findings can be summarised as follows: most children and adolescents rate their health as excellent or good and report medium to high life satisfaction; boys rated their health and life satisfaction more positively than girls did. About one third of girls and one fifth of boys reported multiple psychosomatic complaints. In line with the literature, subjective well-being as a multidimensional construct, consisting of self-rated health, life satisfaction and psychosomatic complaints, was associated with the influencing factors sex, age, family affluence, school pressure and family support, but not with migration status.

The results of this study confirm the results of previous cycles of the HBSC study and other national, population-based studies. Current data from the German Health Interview and Examination Survey for Children and Adolescents (KiGGS Wave 2) also demonstrate that most children and adolescents are in good or very good health [25]. However, whereas the results from the HBSC study are based on self-reported data from 11-, 13- and 15-year-old schoolchildren, the results from KiGGS Wave 2 were gained from data provided by the parents of 3- to 17-year-old children; therefore, they have limited comparability. Nevertheless, both studies identified statistically significant differences in health by age and sex. The findings in this article indicate that 11-, 13- and 15-year-old boys rated their health more positively and were more satisfied with their lives than girls were. These sex differences were observed in all age categories and the gap widened in older age groups. However, whereas girls reported excellent or good health and medium to high life satisfaction significantly less
frequently with age, the prevalence among boys hardly changed. These results overlap with previous findings from the international HBSC study [9, 37] and other international surveys on the well-being of children and adolescents [38, 39]. In addition, overall positive trends in self-rated health and life satisfaction were also identified. An increasing proportion of children and adolescents rated their health as excellent or good and reported medium to high life satisfaction compared with previous cycles of the HBSC study [24]. As such, the proportion of young people who rated their health as excellent or good increased from 86.0% (2006) to 87.1% (2010) and 86.6% (2014) to 88.9% (2018). Similarly, the proportion of young people who rated their life satisfaction as medium to high rose from 81.9% (2006) to 84.1% (2010) and 82.6% (2014) to 88.8% (2018).

The age and sex-specific differences identified for self-rated health and life satisfaction could be due to various factors. These include sex-specific developmental aspects that occur during puberty, which also pose differing mental and physical challenges for girls and boys. These comprise physical changes and the development of self-identity [40]. Studies also indicate that girls and boys experience stress and deal with pressure differently due to the demands placed upon them during adolescence. For example, whereas girls often adopt active, problem-focused coping strategies, boys tend to focus on problem-avoidance strategies [41, 42]. At the same time, school pressure increases with age, and this can have an impact on young people’s general satisfaction with life [23].

Even though most children and adolescents rate their health as excellent or good and are satisfied with their lives, results from the HBSC study demonstrate a strong need for action. Around one third of girls and one fifth of boys stated that they suffered from multiple psychosomatic health complaints. Young people were most frequently affected by difficulties in getting to sleep, headaches, backache and stomach ache (data not shown). These symptoms increase significantly among girls with age, which could be explained, for example, by the onset of menstruation and girls’ greater sensitivity to their bodies. This finding is in line with the results of other international studies that identified significantly higher rates of health complaints among girls than boys [43]. In comparison with the prevalences reported by previous cycles of the HBSC study [24], the proportion of young people with multiple psychosomatic complaints has increased continuously over recent years. This illustrates the need for targeted preventive measures and intervention in this area. Since research has shown that biological, cultural and psychosocial influencing factors lead girls and boys to deal with psychosomatic complaints differently [44], a gender-sensitive approach is required in developing prevention and health promotion measures. The measures put in place should aim, among other things, to teach coping strategies to young people to help them deal with stressors and improve their socioemotional skills. Finally, families and schools should work together closely to implement these measures [45].

If all three aspects of subjective well-being are considered together, the results of the multivariate regression not only demonstrate age- and sex-based differences but also indicate differences in subjective well-being that are associated with family affluence. Children and adolescents from families with low or medium family affluence reported a
High family support is associated with better subjective well-being and, therefore, constitutes an important resource in childhood and adolescence.

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significantly lower level of well-being compared to adolescents with high family affluence. Contrary to expectations, the risk faced by children and adolescents with low levels of family affluence compared to those with high levels of family affluence was somewhat lower than the corresponding risk for adolescents with medium compared to high family affluence. A closer examination of these associations in future studies would be very useful. Numerous national and international studies [30, 46, 47] have demonstrated social inequalities in health. The fact that young people from socially disadvantaged backgrounds face adverse impacts on various aspects of their health illustrates the particular need for target group-specific and low-threshold prevention and health promotion measures. This also underlines the importance of developing strategies that treat reducing health inequalities as the central goal of health policy and public health.

The results demonstrate no association between young people’s subjective well-being and migration status. KiGGS Wave 2 also found no statistically significant difference in self-reported general health between children and adolescents with or without a migration background, although migration-related differences in the health behaviour of 11- to 17-year-olds were indeed evident [31]. It should be noted, however, that young people with a migration background constitute a highly heterogeneous group, which is why other migration-related characteristics (such as parental length of stay in Germany and the language spoken at home) also need to be taken into account.

In line with previous results from the international HBSC study [15, 18], the latest data from Germany also demonstrate that young people report poorer levels of subjective well-being when they feel under pressure at school. As such, school pressure is an important risk factor associated with poorer subjective well-being among schoolchildren. Measures in schools aimed at teaching relaxation techniques and coping strategies to deal with school pressure, therefore, could be beneficial [48]. In addition, previous studies have also shown that a positive environment at school and the promotion of student autonomy can have a constructive impact on satisfaction and well-being at school [23]. As a result, measures that focus not only on individual behaviour but also on school processes and structures could have beneficial effects on the health of school-aged children.

Finally, the results of this study underline the importance of family support for the subjective well-being of children and adolescents; this also supports the findings from previous studies [22]. A high level of family support has a positive effect on subjective well-being and, therefore, constitutes an important resource in childhood and adolescence. It can be assumed that family support can also act as a protective factor by mitigating the adverse effects of school pressure on subjective well-being. Future studies could use moderation analyses to investigate these relationships in more detail.

The present study has numerous strengths. These include the standardised procedure applied for data collection by the HBSC study, the use of validated instruments that have been tested at the international level, the large sample size and the collection of data from the subjective perspective of the children and adolescents. However, the cross-sectional design poses a limitation as it prevents an investigation of causal relationships. Furthermore, only
12.0% of the variance in the subjective well-being of children and adolescents could be explained by the socio-demographic and psychosocial factors under analysis (data not shown). Therefore, it is important to determine which other factors that could not be taken into account by this study also influence subjective well-being. These could range from other psychosocial factors such as bullying [17] to behavioural factors and chronic illnesses [49].

In summary, most children and adolescents rate their subjective well-being as very good or good. However, health impairments exist particularly among girls, older adolescents, young people with low family affluence and those under pressure at school. Further, family support has proven an important resource for subjective well-being. The results of this study provide a starting point for target group-specific prevention and health promotion measures. In addition to measures at the individual level, which should aim to teach coping strategies for dealing with stressors, measures at the family and school levels aimed at strengthening skills and improving the structural framework could help promote the subjective health and well-being of children and adolescents. Health promotion in schools, in particular, would provide broad access to all children and adolescents regardless of their sociodemographic and socioeconomic situation. In the future, data from the HBSC study could be used for international comparisons and trend analyses to study a large number of indicators of the health and health behaviour of children and adolescents. In addition to KiGGS, therefore, the HBSC study plays an essential role in health monitoring as it provides important information about the health of children and adolescents in Germany as well as a foundation on which to plan measures for prevention and health promotion.

Target group-specific prevention and health promotion measures are required to improve the subjective health and well-being of children and adolescents.
Subjective health and well-being of children and adolescents in Germany

provided by the Martin Luther University Halle-Wittenberg (Prof. Dr Richter), Brandenburg University of Technology Cottbus-Senftenberg (Prof. Dr Bilz), Heidelberg University of Education (Prof. Dr Bucksch), Bielefeld University (Prof. Dr Kolip), Eberhard Karls University Tübingen (Prof. Dr Sudeck) and the University Medical Center Hamburg-Eppendorf (Prof. Dr Ravens-Sieberer).

Conflict of interest
The authors declared no conflicts of interest.

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References
Subjective health and well-being of children and adolescents in Germany


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Physical activity and dietary habits of older children and adolescents in Germany – Cross-sectional results of the 2017/18 HBSC study and trends

Abstract

Numerous findings are known to exist between dietary habits, physical activity, and child and adolescent health. Here, we will use data from the most recent Health Behaviour in School-aged Children (HBSC) study to describe dietary habits and patterns of physical activity. Using the survey data for 11-, 13- and 15-year-old students from across Germany, we report findings for key indicators of diet and physical activity for the 2017/18 cycle. By comparing these findings with data from the 2009/10 and 2013/14 survey cycles, we also consider current trends. Results from the most recent cycle show that 10.0% of girls and 16.9% of boys meet the World Health Organization’s (WHO) physical activity recommendations. Across all HBSC cycles, this is the lowest figure so far. Concerning dietary habits, 50.6% of girls and 59.0% of boys reported having breakfast every morning. Data for daily fruit, vegetable and soft drink consumption emphasises the need to promote a healthy diet among adolescents. For all indicators of physical activity and diet, differences between girls and boys are apparent. Girls’ intake of fruit and vegetables is higher and they consume fewer soft drinks, yet boys are more physically active and have breakfast more regularly. For the majority of indicators of dietary habits and physical activity, considerable inequalities relating to family affluence are observed. An important implication of the study results for dietary habits and physical activity of older children and adolescents is the need to foster settings-based approaches to promote physical activity and a healthy diet that integrate a gender-sensitive perspective.

1. Introduction

Sufficient physical activity and a balanced diet are important factors that influence a person’s health over their lifetime. Already during childhood and adolescence, high levels of physical activity provide benefits to physical and mental health [1]. In a similar manner, eating fruit and vegetables every day, regularly having breakfast daily, as well avoiding the regular consumption of soft drinks, benefit a person’s physical and cognitive development [2]. The positive effects of physical activity and diet during childhood and adolescence on the healthy development of body weight, bone health and higher academic achievement illustrate this fact [3–6].

In combination, physical activity and diet play an important role in balancing energy uptake and expenditure [1, 4].
Moreover, as ample evidence exists for the effects of physical activity and dietary habits on the development of chronic disease at adult age [7, 8], this highlights the need to provide initiatives for and to promote health-benefiting levels of physical activity and healthy dietary habits among children and adolescents [9, 10].

During recent years, diverse recommendations for physical activity have been developed. Among them are Germany’s recommendations for physical activity behaviour and the promotion of physical activity, which were published on behalf of Germany’s Federal Ministry of Health (BMG) and recommend a minimum target of 90 minutes of physical activity of at least moderate intensity per day for children and adolescents [11]. Moderate intensity physical activities include, for example, brisk walks or other physical activities that lead to a slight increase in heart rate and breathing, but where talking is still possible. Vigorous intensity activities accelerate a person’s heart rate further, cause them to sweat and become out of breath, therefore making it difficult to talk to others. Health-oriented physical activity recommendations for children and adolescents usually refer to this differentiation of exercise intensity, and include at least moderate intensity activities during daily life and leisure time. Doing sports is a specific form of physical activity usually related to a particular type of sport or structured training. Sports can make up an important part of vigorous physical activity and would then also contribute to health-enhancing moderate to vigorous physical activity (MVPA). The World Health Organization’s (WHO) recommendations on physical activity already consider a daily minimum of 60 minutes of moderate intensity physical activity as providing children and adolescents with substantial health benefits. Compared to Germany’s national recommendations, it is therefore considered that already these lower levels provide health benefits [12].

In spite of the obvious health benefits linked to dietary habits and levels of physical activity, from a population perspective, the question remains how many children and adolescents actually behave in line with these recommendations. According to an international comparative study, at a global level, 15.3% of 11- to 17-year-old girls and 22.4% of boys in the same age range met the WHO recommendations for physical activity. Figures for Germany (20.3% and 12.1%, respectively) would then be below the global average [13]. If we more narrowly focus on sports, further studies indicate that many children and adolescents regularly engage in sports. However, it remains rather unclear how far sport contributes to older children and adolescents fulfilling the physical activity recommendations. For sports, considerable differences between the sexes and regarding socioeconomic status were repeatedly observed to the detriment of girls and socially marginalised groups. These differences are also visible, although are less pronounced, in the figures for those who meet the WHO physical activity recommendations for total health-benefiting physical activity [14, 15].

The recommendations on dietary habits include those augmented by the German Nutrition Society (DGE) [16], as well as by the WHO [17]. Three portions of vegetables and two portions of fruit daily are recommended [16], as well as sufficient energy-free or low-energy soft drinks to reduce the consumption of free sugars to less than 10% of daily energy uptake [17]. Data from the second follow-up to the German Health Interview and Examination Survey
for Children and Adolescents (KiGGS Wave 2) found that only one in six children met the recommended ‘five portions daily’ of fruit and vegetables [23]. Earlier HBSC study data also showed potential for improvement in dietary habits. By sex, girls do better [14, 15].

Such findings from health reporting have already led to initiatives to align and strengthen a number of measures to promote physical activity and healthier dietary habits, for example the National Action Plan ‘In Form – German national initiative to promote healthy diets and physical activity’ [18]. Against this backdrop, and based on recent data, this paper presents findings from the 2017/18 Health Behaviour in School-aged Children (HBSC) study on physical activity and dietary habits during late childhood and adolescence. Moreover, trends are described that provide us with a wider picture of the analysed survey variables across the three last survey cycles.

2. Methodology
2.1 Sample design and study implementation

The analyses in this paper are based on German HBSC study data. Mostly we rely on data that was collected in the 2017/18 school year, with a total of 2,306 girls and 2,041 boys in the three age groups of 11-, 13-, and 15-year-olds surveyed. To analyse trends for our indicators, we also used data from previous survey cycles that used identical surveying methods in Germany-wide samples during 2009/10 [14] and 2013/14 [15]. For the study variables covered here, neither answers nor answering formats changed over time. During all surveying points, HBSC relied on a standardised protocol that is assembled within the International Coordinating Centre for each survey cycle. The survey instruments have been successfully used for years and the reliability as well as the validity of the indicators used here have been examined by numerous studies with satisfactory or good results [19]. Moor et al. in this issue of the Journal of Health Monitoring provide a detailed description of the study design and background.

2.2 Survey instruments

The focus of this paper are indicators of physical activity and dietary habits, with sex, age and family affluence used as socioeconomic stratification variables. Sex is determined through the dichotomous answer of ‘girl’ or ‘boy’. Age is defined through the age categories 11, 13 or 15 years. To measure the social status of adolescents, HBSC surveys socioeconomic status based on family affluence (FAS). A detailed description is included in Moor et al. in this issue of the Journal of Health Monitoring.

Indicators of physical activity and sports

Physical activity of at least moderate intensity was measured by asking how often during the last seven days the older children and adolescents had been physically active for at least 60 minutes. Examples were provided to explain that this includes any kind of physical activity during the day that increases pulse rate and leaves you out of breath for some time. Participants could tick one out of eight answer boxes between zero and seven days. With these answers, two indicators were then created. First, it was determined whether students had been moderately physically active during at least 60 minutes per day and had therefore engaged in
levels of physical activity that are considered to promote health (‘WHO physical activity recommendations fulfilled’). Secondly, those students who answered between zero and two days, i.e. that had been moderately physically active for 60 minutes during less than three days per week, were identified (‘low levels of physical activity’).

In addition to information on general physical activity, the HBSC study also collects data on sports. As the answers for our first indicator (sometimes called the MVPA Indicator, i.e. Moderate-to-Vigorous Physical Activity) refer to any kind of activity during leisure time and daily life, the response actually includes sports-related activities solely/only. For a more specific analysis of sports with its often higher intensity and particular forms of organisation (such as sports clubs and fitness studios), participants were asked how often they engaged in sports activities during leisure time with an intensity that left them out of breath and/or sweating. Students were able to choose from seven answers ranging from ‘every day’ to ‘never’. The answers were dichotomised for analysis in accordance with international reports such as the HBSC study [19], and used sports activities during at least four days per week as the reference value.

Diet-related indicators
Dietary habits are described based on fruit, vegetable and soft drink (defined as Cola or other sugary lemonades) consumption. The survey asked how often these had been consumed on a seven-point scale ranging from ‘never’ to ‘several times per day, every day’. Based on the current DGE and WHO recommendations, the analyses present the proportion of participants who eat fruit and vegetables at least daily and drink soft drinks at least less than daily. A further indicator was the number of school days on which girls and boys ate breakfast at home before going to school. Breakfast was defined as ‘more than a glass of milk or juice’. The analyses refer to the proportion of participants that have breakfast every day versus those who do not. The indicator shows the frequency with which participants have breakfast as a health-relevant dimension [3, 6]. All indicators of physical activity and diet were operationalised to ensure their comparability with international HBSC reporting standards [19].

2.3 Statistical methods
The core results are presented descriptively as prevalences or percentage frequencies with 95% confidence intervals (CI) and separately for girls and boys. The results are also stratified by age and family affluence. Discrepancies in the total number of girls and boys in the tables are owed to missing data for individual variables. To statistically secure this descriptive information regarding the sample subgroups, binary logistic regressions were calculated. Correlations between the sociodemographic markers of sex, age and family affluence and behaviour-related variables were estimated based on regression models that adjusted all of the variables. The results are presented as odds ratios (OR) and 95% CI. Trends are described for all the variables relevant to diet and physical activity for the last three survey cycles through percentage frequencies for both sexes.

All analyses were conducted with SPSS 24. To optimise representativeness, a weighting factor was introduced. The weighting factors correct for slight differences between
3. Results

Indicators of physical and sports-related activities

10.0% of girls and 16.9% of boys fulfilled the WHO recommendations for physical activity. The proportion of girls and boys that fulfil the WHO physical activity recommendations decreases with age. Logistic regression analyses highlight statistically significant differences for sex and age groups. 15-year-old girls thereby achieved the lowest values, with only 7.3% stating that they were physically active every day for at least 60 minutes. With regard to family affluence, the

<table>
<thead>
<tr>
<th></th>
<th>WHO recommendations for physical activity</th>
<th>Low levels of physical activity</th>
<th>Sports (≥ 4 days per week)</th>
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<tbody>
<tr>
<td></td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
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<tr>
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<td>Age group</td>
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<tr>
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<td>23.9 (20.7–27.4)</td>
<td>42.7 (38.9–46.6)</td>
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<td>27.5 (24.2–31.0)</td>
<td>30.3 (26.8–33.9)</td>
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<td>15 years</td>
<td>7.3 (5.6–9.3)</td>
<td>38.9 (35.6–42.4)</td>
<td>23.9 (21.1–27.1)</td>
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<td>40.3 (35.5–45.2)</td>
<td>25.0 (21.0–29.5)</td>
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<td>30.6 (28.1–33.1)</td>
<td>30.8 (28.3–33.4)</td>
</tr>
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<td>19.7 (15.9–24.1)</td>
<td>44.2 (39.2–49.4)</td>
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<tr>
<td>11 years</td>
<td>21.2 (18.1–24.7)</td>
<td>19.0 (16.0–22.4)</td>
<td>58.7 (54.7–62.6)</td>
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<tr>
<td>13 years</td>
<td>16.4 (13.7–19.5)</td>
<td>19.7 (16.8–23.1)</td>
<td>51.3 (47.4–55.3)</td>
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<td>15 years</td>
<td>12.9 (10.4–15.9)</td>
<td>25.4 (22.1–29.1)</td>
<td>40.0 (36.2–44.0)</td>
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<td>Family affluence</td>
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<td>Low</td>
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<td>31.2 (26.2–37.1)</td>
<td>45.9 (40.1–51.9)</td>
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<td>20.4 (18.2–22.7)</td>
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<td>High</td>
<td>22.4 (17.9–27.6)</td>
<td>14.9 (11.3–19.6)</td>
<td>62.4 (56.6–67.9)</td>
</tr>
</tbody>
</table>

Cl = Confidence interval, WHO = World Health Organization

*WHO recommendations = 60 minutes of at least moderately intense physical activity on all seven days of the week

**Low levels of physical activity = 60 minutes of at least moderately intense physical activity on less than three days per week

Across the survey cycles, fewer girls (2017/18: 10%) and boys (2017/18: 16.9%) meet the WHO physical activity recommendations.
therefore categorised as having low levels of physical activity. This difference by sex is statistically significant. By age, low levels of physical activity were more pronounced among 15-year-old girls and boys compared to the two younger age groups, with no significant statistical differences found for affluent families; however, this was not statistically significant in the multivariate model (Table 1 and Table 2).

One fifth of boys and one third of girls were physically active for 60 minutes on less than three days per week, and highest values for girls (14.5%) and boys (22.4%) were found for affluent families; however, this was not statistically significant in the multivariate model (Table 1 and Table 2).

One fifth of boys and one third of girls were physically active for 60 minutes on less than three days per week, and therefore categorised as having low levels of physical activity. This difference by sex is statistically significant. By age, low levels of physical activity were more pronounced among 15-year-old girls and boys compared to the two younger age groups, with no significant statistical differences found

| Table 2 |

| Odds ratios and 95% confidence intervals for indicators of physical activity and dietary habits by sex, age and family affluence (multivariate logistic regression model including all predictors) |
| Source: 2017/18 German HBSC study |

<table>
<thead>
<tr>
<th></th>
<th>WHO recommendations for physical activity* (n=4,219)</th>
<th>Low levels of physical activity** (n=4,219)</th>
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<tr>
<td>13 years</td>
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<td>15 years</td>
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<td>1.68 (1.41–2.00)</td>
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<td>Medium</td>
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<td>Girls</td>
<td>0.54 (0.45–0.65)</td>
<td>1.59 (1.38–1.83)</td>
<td>0.46 (0.41–0.53)</td>
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<tr>
<th></th>
<th>Fruit daily (n=4,196)</th>
<th>Vegetables daily (n=4,195)</th>
<th>Soft drinks not daily (n=4,200)</th>
<th>Breakfast daily (n=4,200)</th>
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<tr>
<td>13 years</td>
<td>0.74 (0.63–0.87)</td>
<td>0.87 (0.74–1.03)</td>
<td>1.36 (1.09–1.70)</td>
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<td>15 years</td>
<td>0.52 (0.45–0.61)</td>
<td>0.73 (0.62–0.87)</td>
<td>1.33 (1.06–1.65)</td>
<td>0.48 (0.41–0.57)</td>
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<td>High</td>
<td>1.76 (1.41–2.18)</td>
<td>1.60 (1.27–2.02)</td>
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<td>1.76 (1.41–2.18)</td>
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<tr>
<td>Girls</td>
<td>1.57 (1.38–1.78)</td>
<td>1.59 (1.39–1.83)</td>
<td>0.61 (0.51–0.73)</td>
<td>0.73 (0.64–0.82)</td>
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</table>

OR = Odds ratio, CI = Confidence interval, WHO = World Health Organization

*WHO recommendations = 60 minutes of at least moderately intense physical activity on all seven days of the week

**Low levels of physical activity = 60 minutes of at least moderately intense physical activity on less than three days per week
**FOCUS**

Physical activity and dietary habits of older children and adolescents in Germany

**Figure 1**
Comparison of indicators ‘WHO recommendations for physical activity’, ‘low levels of physical activity’ and ‘sports (at least four times per week)’ by sex across the HBSC survey cycles 2009/10 (n=2,525 girls, n=2,364 boys), 2013/14 (n=2,857 girls, n=2,967 boys), 2017/18 (n=2,278 girls, n=2,021 boys)

Source: 2009/10, 2013/14 and 2017/18 German HBSC study

Between 11- and 13-year-old girls and boys (Table 2), furthermore, there was an inverse relationship between the proportion of girls and boys in the low physical activity group and family affluence: whereas two out of ten girls with high family affluence were physically less active, four out of ten girls in the low family affluence group were less physically active per week.

For sports, similar patterns emerged: in particular boys, younger students and girls and boys from high affluence families considerably more frequently participated in sports-related activities on more than four days per week. Around half of all boys fulfilled this criterion, yet only about one in three girls performed sports activities at least four times per week. Moreover, levels of sport decreased with age.

**Dietary indicators**

50.6% of girls and 59.0% of boys have breakfast at home daily (Table 3). The regression model found the differences between girls and boys, as well as the decrease in figures
In recent years, a decreasing number of older children and adolescents have breakfast every morning, yet they also consume soft drinks less frequently.

88.5% of girls and 82.5% of boys do not consume soft drinks every day. The correlation between frequent soft drink consumption, age and lower family affluence was found to be statistically significant. In all age groups, girls consumed soft drinks daily less frequently than boys (Table 3). Multivariate regression models showed this to be statistically significant (Table 2).

Figure 2 shows the trend for prevalences of the four indicators of dietary habits. Across the survey cycles, the number of girls and boys that had breakfast daily has decreased continuously (from 63.6% to 50.6% and 67.3% to 59.0% for girls and boys, respectively). For fruit and

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### Table 3

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<tr>
<th></th>
<th>Fruit daily % (95% CI)</th>
<th>Vegetables daily % (95% CI)</th>
<th>Soft drinks not daily % (95% CI)</th>
<th>Breakfast daily % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>48.5 (44.6–52.4)</td>
<td>32.7 (29.1–36.4)</td>
<td>89.1 (86.4–91.4)</td>
<td>63.1 (59.2–66.8)</td>
</tr>
<tr>
<td>13 years</td>
<td>43.1 (39.4–47.0)</td>
<td>33.2 (29.7–36.9)</td>
<td>87.6 (84.8–89.9)</td>
<td>50.9 (47.0–54.7)</td>
</tr>
<tr>
<td>15 years</td>
<td>35.7 (32.5–39.1)</td>
<td>28.8 (25.7–32.0)</td>
<td>88.9 (86.4–90.9)</td>
<td>39.9 (36.5–43.3)</td>
</tr>
<tr>
<td><strong>Family affluence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>37.6 (33.0–42.5)</td>
<td>28.0 (23.8–32.6)</td>
<td>85.4 (81.5–88.6)</td>
<td>39.0 (34.3–43.9)</td>
</tr>
<tr>
<td>Medium</td>
<td>39.8 (37.1–42.5)</td>
<td>29.4 (27.0–31.9)</td>
<td>88.2 (86.3–89.9)</td>
<td>50.7 (48.0–53.5)</td>
</tr>
<tr>
<td>High</td>
<td>55.1 (50.0–60.2)</td>
<td>42.0 (37.0–47.2)</td>
<td>92.9 (89.8–95.1)</td>
<td>64.1 (59.0–68.9)</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>41.4 (37.4–45.4)</td>
<td>28.5 (25.0–32.3)</td>
<td>87.0 (83.9–89.6)</td>
<td>65.5 (61.5–69.2)</td>
</tr>
<tr>
<td>13 years</td>
<td>31.4 (27.9–35.2)</td>
<td>21.3 (18.2–24.6)</td>
<td>80.6 (77.2–83.6)</td>
<td>58.1 (54.1–62.0)</td>
</tr>
<tr>
<td>15 years</td>
<td>23.5 (20.3–27.0)</td>
<td>18.5 (15.6–21.8)</td>
<td>80.0 (76.5–83.0)</td>
<td>53.4 (49.4–57.3)</td>
</tr>
<tr>
<td><strong>Family affluence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>28.3 (23.3–33.9)</td>
<td>19.5 (15.3–24.5)</td>
<td>77.2 (71.7–81.8)</td>
<td>46.2 (40.3–52.1)</td>
</tr>
<tr>
<td>Medium</td>
<td>31.9 (29.3–34.6)</td>
<td>22.7 (20.4–25.1)</td>
<td>83.5 (81.3–85.5)</td>
<td>60.2 (57.4–63.0)</td>
</tr>
<tr>
<td>High</td>
<td>37.7 (32.2–43.6)</td>
<td>24.2 (19.6–29.6)</td>
<td>85.0 (80.1–88.9)</td>
<td>68.2 (62.4–73.4)</td>
</tr>
</tbody>
</table>

CI = Confidence interval
* Missing values lead to different numbers of respondents for individual indicators.
4. Discussion

The HBSC data from the 2017/18 survey cycle was described through a set of indicators based on self reported data on physical activity and dietary habits. Generally, the data shows a need for actions to promote physical activity and a healthy diet during childhood and adolescence.

Indicators of physical activity and sports

In light of the finding that only one in ten girls, and one in six boys, fulfill the WHO recommendations, we must point out a widespread lack of physical activity in the 11-, 13- and 15-year-old age group. This situation has worsened over time. Further studies corroborate our findings and, compared to vegetable intake, the picture was mixed. During all three survey points, more girls than boys ate fruit and vegetables every day. However, daily fruit and vegetable consumption slightly increased for boys during the survey period (by 2.1 percentage points for fruit and 3.7 percentage points for vegetables), while for girls a slight decrease was observed (by 1.9 percentage points for fruit and 0.6 percentage points for vegetables). In particular between survey cycles 2013/14 and 2017/18, the figures for not drinking soft drinks every day increased for both sexes (from 84.0% to 88.5% and 76.0% to 82.5% for girls and boys, respectively).
other high-income western countries, the figures for Germany are below average [13, 20–22]. In addition, KiGGS Wave 2 data shows that figures for meeting the recommended levels of physical activity have decreased between Wave 1 (2009–2012) and Wave 2 (2014–2017), in particular for 3- to 10-year-old girls. For all other groups of children and adolescents, the figures are stable but remain at a low level [22].

Remarkably, our data shows that the proportion of girls and boys that have low levels of physical activity has increased over time. This means that, in addition to the slight decrease in those who engage in enough physical activity to have health benefits, there has been a substantial increase in the number of older children and adolescents whose levels of physical activity are clearly too low. This observation is in line with KiGGS study results [22] highlighting the need for a differentiated analysis specifically of highly sedentary girls and boys. Importantly, our survey instrument thereby does not allow respondents to be differentiated according to the degree by which they fulfil the recommended 60 minutes of daily physical activity. From a health perspective, this lack of precision is relevant too, as it does make a difference whether the recommended levels of activity were missed by 5 or by 50 minutes.

For the frequency of sports, which is a specific aspect of overall physical activity, current HBSC study data confirms findings of a relatively high prevalence, which is skewed towards boys [15, 21]. Presumably, therefore, sport is a factor that, overall, raises figures for fulfilling the recommended healthy levels of physical activity among boys. However, with regard to reaching levels of physical activity beneficial to health, sports represent the most important physical activity for a relatively small proportion of adolescents [23]. Comprehensively promoting physical activity among older children and adolescents will therefore require a combined strategy that not only promotes participation in structured sports, but also generally promotes physical activity in leisure time and daily life.

Indicators of dietary habits
The figures for daily soft drink consumption have decreased and levels of fruit and vegetable intake remain stable at levels with a potential for improvement. Yet with regard to having breakfast, our data points to a negative development. This finding is in line with other (inter)national findings [14, 15, 24–26].

A closer analysis of individual indicators shows some issues worthy of discussion. The decrease in the frequency with which older children eat breakfast every morning is at least partially due to age-typical developments. Daily and sleep rhythms change during adolescence, and breakfast time often competes with sleeping time [27]. Furthermore, distancing oneself from one’s parents is normal at this age and can lead adolescents to no longer regularly take part in family meals [28]. An increasing orientation towards body ideals and more frequent dieting explain the particularly low prevalence found for older girls [29].

A potential weakness of this indicator is that students could hypothetically also regularly have breakfast at school, a fact not reflected by the corresponding question. Broadening the question in this manner, however, would not reflect school realities. Schools do not offer breakfast before lessons, and having breakfast later, for example during the first longer break, has drawbacks, such as with regard to body energy requirements.

Fruit and vegetable consumption should be promoted among older children and adolescents in line with the recommendations made by the German Nutrition Society (DGE).
The results for fruit and vegetable intake reveal a noticeably clear trend, showing that children and adolescents are not meeting the DGE recommendations [16]. One weakness worth taking into account is that the applied measurement instrument does not entirely reflect the recommendations. KiGGS Wave 2 data corroborates our results [26]. Surveys of the adult population also indicate low levels of vegetable intake in particular [30]. Intervening early in the school environment would therefore promising, for example by promoting a higher fruit and vegetable intake through novel taste experiences.

With age, the number of students who say that they consume soft drinks daily decreases. KiGGS data is in line with this primarily positive finding and confirms that sugary drinks consumption decreases across all groups, with a concurring considerable rise in the amount of water consumed [26]. International data, too, supports this positive trend [25]. It cannot be ruled out, however, that greater public awareness concerning sugary drinks may have distorted the responses. However, it is just as possible that the installation of, for example, water dispensers in schools and the provision of drinks in classrooms offer a realistic explanation for this positive development.

Broader context
For all indicators of dietary habits and physical activity, considerable differences between girls and boys were evident. While on average a majority of older children and adolescents do not fulfill the recommendations for diet, the dietary habits of girls, as much regarding fruit and vegetable intake as soft drink consumption, are clearly healthier across all surveys [29]. The opposite is true for physical activity. HBSC data confirms the findings of other studies such as KiGGS [22, 26]. As has been observed, the importance of gender-specific behaviour as an expression of gender identity increases in particular during adolescence. While female adolescents are more oriented towards slim body ideals and increasingly diet to lose weight (for example by not having breakfast), male adolescents are driven by athletic body ideals and the desire to develop a muscular physique [31]. These gender ideals frequently appear, particularly in nutritional campaigns (e.g. through the use of body images), as a starting point for a supposedly target-group orientated approach to healthy eating. However, such approaches only serve to further reinforce gender stereotypes. New prevention measures should therefore aim not to further strengthen stereotypes, and must achieve this by reflecting on gender differences and using gender-sensitive forms of communication [32].

Further expanding systematic measures to promote physical activity and a healthy diet should therefore specifically take the gender perspective into account (in particular during and after puberty). Different factors create the conditions that lead girls and boys to change their behaviour, and these factors are, not least, context and behaviour specific (for example regarding active transport [33]). Moreover, findings from nutritional and sports science on the positive effects of behaviour indicators need to be considered and communicated to the target group, so that health competency can become the basis of decision-making. Though many may not be aware, a regular breakfast can, for example, benefit performance and concentration as well as positively influence weight regulation [24, 34, 35].

For the majority of indicators, 2017/18 HBSC data clearly shows that socioeconomic status continues to play a role...
in further reinforcing health inequalities. In spite of increasing awareness, results from various studies indicate that these inequalities have not decreased during recent years [25]. For some indicators, the differences are substantial (for example regarding participation in sports), whereby a lack of financial means or other barriers to participation are possible explanations. For diet and physical activity, the most recent HBSC data emphasises a need to make greater efforts for equal social opportunities, and the data should be used more intensively for future action in the fields of health promotion and prevention. Not least, this implies the need for an even greater focus on settings-based perspectives to promote physical activity and a healthy diet. For example, efforts should be increased to intensify approaches that aim to structurally anchor the availability of attractive and healthy food options for snacks and lunch at school. Given the generally positive effects on performance and concentration, offering balanced breakfasts at school could create more equality in education and of opportunities, in particular regarding children and adolescents who come to school without having eaten breakfast [36]. Taking into account adolescent eating habits [28], schools could contribute by offering innovative snacks with a relevant proportion of fruit and vegetables [37].

The chances of success for a targeted development of measures that are also settings-based appears to depend, on the one hand, on more actively integrating socially disadvantaged groups into the design and implementation of measures [36–38]. On the other hand, focusing solely on the school setting is not enough and schools must be considered within a wider socioecological context. In the promotion of physical activity, there appear to be some positive examples [39, 40]. However, we need to recognise that overall there is too little knowledge on why and under which circumstances a particular intervention is effective in various target groups of children and adolescents [41, 42].

Conclusion
For dietary habits and physical activity in general, a set of prevalence patterns depending on sex, age and family affluence can be distinguished, and it would be important to discuss the implications with regard to developing a better combination of behaviour and setting-based approaches [43]. While the empirical research on increasing equal opportunities in society through intervention measures during childhood and adolescence remains limited [42], findings indicate [33, 44] that strengthening settings-based approaches would increase the likelihood of successfully increasing levels of physical activity and healthier dietary habits among all children and adolescents.

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Physical activity and dietary habits of older children and adolescents in Germany

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Data protection and ethics
The survey was strictly confidential and conducted in strict compliance with data protection regulations. Prior to the study, a concept for data protection was developed jointly with the data protection officer of Martin Luther University Halle-Wittenberg.

The concept for data protection is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The study also received the approval of the Ethics Committee of the General Medical Council Hamburg (processing code PV5671).

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Conflict of interest
The authors declared no conflicts of interest.

References


Physical activity and dietary habits of older children and adolescents in Germany


Physical activity and dietary habits of older children and adolescents in Germany


Gender role orientation and body satisfaction during adolescence –
Cross-sectional results of the 2017/18 HBSC study

Abstract
During adolescence both sexes experience a loss of body satisfaction, whereby the effect is greater among girls. Coming to terms with gender roles is an important step in the development of a person’s identity. Traditional gender roles tend to emphasise certain physical attributes: attractiveness in women, and strength and dominance in men. This article analyses associations between a traditional gender role orientation and body satisfaction during adolescence based on logistic regression models and using data taken from the 2017/18 Health Behaviour in School-aged Children (HBSC) study (n=1,912 girls, n=1,689 boys).
The results show an overall high degree of body satisfaction, with girls scoring lower than boys. Role preconceptions were mostly not traditional, with boys being slightly more traditional than girls. In both sexes, a more traditional role orientation was accompanied by lower levels of body satisfaction; in boys, this effect was seen to decrease with age.
The stereotypical features of role preconceptions are examined as a possible explanation for these differences. An alternative explanation posits that an egalitarian role orientation (i.e. one based on the principle of equality) creates a more tolerant environment with greater social support, which could foster a greater sense of self-acceptance. These results indicate that questioning traditional preconceptions of gender roles during adolescence may help prevent problems related to body image in both sexes.

1. Introduction

Differences between the sexes during adolescence are evident in numerous indicators of physical and mental health, as well as of health behaviour [1, 2]. While during childhood the health of boys is more vulnerable, as children enter adolescence, girls more frequently report psychosomatic complaints or lower levels of well-being [3, 4].

Explanations for these differences are often generally based on a differentiation between biological sex and social gender, whereby the relevance of gender and the construction of a gender identity is highlighted [1]. A conclusive empirical explanation for these differences depends on the collection of data for social gender indicators. However, it remains unclear how to capture gender through empirical studies. Equally, there are no convincing concepts to dissolve our
Gender role orientation and body satisfaction during adolescence

binary construct of sex [3]. Conceptually, it is safe to assume that social aspects of sex (gender) can be depicted at different levels, ranging from the individual to the social. International empirical surveys thereby reveal that greater equality at the societal level is related to a greater physical and mental well-being of adults and adolescents of both sexes [4–7].

To further clarify these correlations at the individual level, the current cycle of the Health Behaviour in School-aged Children (HBSC) study [8] applied an instrument to survey traditionally oriented gender role preconceptions as an element of gender. Gender roles consist of individual and socially shared stereotypical concepts of typical traits for girls/women and boys/men, and the behaviour believed typical and acceptable based on ascribed gender [9, 10]. Coming to terms with role preconceptions associated with sex is one of the central developments a person experiences during adolescence. In this phase, people go through a number of physical, mental, and social processes of maturation and these processes shape their self-image [11]. During this process, adolescents develop an understanding of the degree to which the body that they develop during puberty corresponds to society's concepts of femininity or masculinity. Such concepts therefore gain greater personal importance [12].

From today's perspective, expectations surrounding gender, e.g. that it is important for girls to be a good mother and wife, and that boys should develop leadership qualities and show authority, can be interpreted as corresponding to more ‘traditional’ concepts of gender roles. In Germany, only a small fraction of adolescents hold such traditional views, whereby such views are more common among boys, adolescents with a migration background and adolescents with low levels of education than among girls, adolescents without a migration background and those with a higher level of education [13–16]. Notably, since the turn of the century, attitudes towards gender roles in Germany have continued to evolve into a more egalitarian model [17]. Role preconceptions also play into expectations regarding attractiveness: according to traditional gender roles, it is more important for girls to be pretty and attractive for the opposite sex in order to find a husband, whereas for boys, being attractive has traditionally played a lesser role [10, 12, 18].

Being satisfied with one’s physical appearance and body is an aspect of one’s body image, a concept which concerns the feelings, thoughts, judgements and in some cases behaviours related to how one perceives one’s own body [19]. Body satisfaction thereby focuses on an overall assessment of a number of bodily traits and can be conceptualised as an element of subjective well-being [20, 21]. The importance of body satisfaction generally increases during adolescence [22, 23]. Lower levels of body satisfaction are related to risky health behaviour in both sexes, such as weight reduction and extreme body shaping and considered a key risk factor for eating disorders [24, 25].

Body dissatisfaction is more common among girls than boys [26, 27]. The usual explanation is that during puberty the bodies of girls do not tend to develop in line with Western ideals of slimness, while the changes boys undergo (such as muscle and beard growth) bring them closer to masculine ideals. Whereas the pressure to be ‘good-looking’ was for a long time deemed to apply almost exclusively
to girls, boys and men are today observably also coming under increasing pressure to conform to socially determined body ideals. The increasing number of images of (ideal) male bodies in the media, for example, is indicative of an increasing objectification of male bodies [28, 29]. This is accompanied by increasing body dissatisfaction also among boys [19, 30, 31]. Most surveys, however, focus on dissatisfaction with weight, a problem which is more relevant to girls, and focus less on other aspects such as a muscular appearance, which is more crucial for boys [32–34].

As concepts of attractiveness are bound directly to gender [19, 35–37], there is a good case to believe that the pressure to conform to specific female and male ideals is also related to adolescents’ internalised gender roles. Some studies with adolescents indicate that in both sexes a stronger identification with typically female traits is a risk factor for problems with body image and eating disorders, whereas a greater identification with male connoted traits is a protective factor [38]. On the other hand, it appears to be the case that for both girls and boys the risk of developing eating disorders increases when self-image differs from the stereotypical gender norm, but the risk for body dissatisfaction does not [39].

With regard to body image, few surveys have so far assessed the role traditional gender norms, which create gender inequality, play with regard to body image during a phase in which reconciling a gender role with one’s self-image is an important developmental step.

More traditional gender roles could result in girls placing greater importance on being attractive and therefore potentially increase their susceptibility to problems with body image. Indeed, studies have shown that among women, traditional concepts of femininity are associated with a greater desire to be slim [34].

For boys, with regard to traditional gender roles, it can be assumed that physical appearance is not as important. Certain findings concerning adolescents appear to corroborate this fact [14, 40]. However, the traditional emphasis on physical strength and superiority of the male gender can be reflected in the expectation of having a muscular body, potentially leading to body dissatisfaction in boys with traditional role preconceptions who do not meet this ideal. Some empirical studies have shown that traditional concepts of masculinity among young men are associated with a more pronounced desire to have a muscular appearance [34, 41–43].

This article analyses how an individual’s gender role orientation, i.e. the preconceptions of typically female or male traits, privileges or gender expectations, are related to the body satisfaction of adolescent girls and boys. As both body image and also the importance an individual places on gender roles are processes in development, we also analyse how the studied relations develop with age.

2. Methodology

2.1 Sample design and study implementation

The 2017/18 HBSC study used a written questionnaire, which was handed out to students in years five, seven and nine. A multi-stage procedure was used to randomly select schools across Germany, and school classes at these schools were again randomly selected for the survey. The German data set collected data from a total of 4,347 adolescents (2,306 girls and 2,041 boys). To correct for deviations in terms of
representability with regard to federal state, type of school, sex and age group, the analyses were conducted with weight-
ed data. A detailed description of the HBSC study and its
methodology are included in the article by Moor et al. [8] in
this issue of the Journal of Health Monitoring.

2.2 Surveying instruments

Using a questionnaire, adolescents were asked about gen-
der role preconceptions, body satisfaction, height and weight,
and data was collected on indicators for family affluence and
migration background, as well as month and year of birth.

Data on gender role perceptions was collected based
on a shortened version of the Attitudes Toward Women
Scale for Adolescents [44, 45]. On a five-point scale, ado-
lescents were asked to state to which degree they agreed
with five statements on female and male gender roles and
traits. Table 1 contains the wording of these items. Values
ranged from zero to four, with higher values indicating a
greater approval of traditional gender role concepts.

With a Cronbach’s alpha of 0.85 for the total sample
(girls=0.83; boys=0.85), the unidimensional scale achieved
satisfactory internal consistency. Scale values were calcu-
lated as mean values of the item if at least four of the five
items were answered.

To measure body image, this analysis used measures
that are not focussed on specific body parts, which often
have a very different meaning for girls and boys; instead,
宙 looked more generally at how satisfied adolescents were
with their physical appearance. Data on satisfaction with
one’s appearance was collected via a sub-scale of the Body
Investment Scale (BIS) [45, 46]. The scale collects data for
six statements related to emotion-based attitudes to one’s
body and appearance on a five-point scale (Table 1).

Cronbach's alpha for the scale was 0.88 in the total sam-
ple (girls=0.90; boys=0.83). A mean value was calculated
for items if at least five out of the six items were answered.

Data provided on body height and weight was used to
calculate corresponding Body Mass Indexes (BMI), and
year of birth data to calculate age at the time of the survey.

<table>
<thead>
<tr>
<th>Shortened version of the Attitudes Toward Women Scale for Adolescents as a measure of traditional gender role orientation</th>
<th>Sub-scale of the Body Investment Scale (BIS) on emotional attitudes towards body and physical appearance as a measure of body satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>More encouragement in a family should be given to sons than daughters to go to college.</td>
<td>I am frustrated with my physical appearance.</td>
</tr>
<tr>
<td>In general, the father should have greater authority than the mother in making family decisions.</td>
<td>I am satisfied with my physical appearance.</td>
</tr>
<tr>
<td>It is more important for boys than girls to be well at school.</td>
<td>I hate my body.</td>
</tr>
<tr>
<td>Boys are better leaders than girls.</td>
<td>I feel comfortable with my body.</td>
</tr>
<tr>
<td>Girls should be more concerned with becoming good wives and mothers than desiring a professional or business career.</td>
<td>I feel anger toward my body.</td>
</tr>
<tr>
<td>I like my appearance in spite of its imperfections.</td>
<td></td>
</tr>
</tbody>
</table>

* The five-point response scale ranged from ‘strongly agree’ to ‘strongly disagree’. During evaluation, the values were coded between zero and four, whereby higher values stand for a more traditional role orientation or higher body satisfaction.
Based on the study design, three age groups were differentiated: 11-, 13- and 15-year-olds, whereby the actual age of students in these age groups hovered around the median value. Family affluence was measured based on the Family Affluence Scale (FAS) [47]; a possible migration background was defined through data on the country of birth of adolescents and their parents [8].

2.3 Statistical methodology

Mean values and standard deviations for girls and boys were defined and compared via t-tests and/or U tests between girls and boys. Gender role and body image distribution were heavily skewed, which is why median values and interquartile ranges are also provided. All analyses were conducted with weighted data. Statistical analyses applied R software (version 3.5.1 [48]) using the packages ‘survey’ [49] and ‘ggplot2’ [50].

For the predictive models, we dichotomised body satisfaction (also due to the skewed distribution) based on the median: the lower 50% of values for girls and boys were classified as (sex-specific) low body satisfaction, the upper 50% constituted the reference group with relatively high body satisfaction. This led boys to be classified as dissatisfied if their value on the BIS scale was below 3.4, and girls as (relatively) dissatisfied if their value on the BIS scale was below 3.0.

The dichotomised values for body dissatisfaction were predicted using logistic regression models for both girls and boys. The models predict the probability for body dissatisfaction depending on how strongly a person upholds traditional gender role orientations. Yet, because the probability of body satisfaction, next to sociodemographic background variables such as age group, family affluence and migration background, also depends on further factors, the model also included Body Mass Index (BMI). Odds ratios were calculated for the models.

In a further step, the interactions between role orientation and age group as well as BMI were tested. To illustrate interaction effects with age, the predicted associations between role orientation and the probability for low levels of body satisfaction are visualised (Figure 1 and Figure 2) for the three age groups.

3. Results

3.1 Description of the sample

Weighting was applied to achieve parity between the number of girls and boys in the sample. There was also roughly the same number of students in each of the three age groups, with a median age of 13.4 (standard deviation (SD)=1.71). Table 2 presents the values for the measures used for both sexes. Significance values refer to differences between the medians for girls and boys.

The scale for gender role preconceptions was significantly skewed. Most adolescents in the German HBSC study rejected traditionally orientated gender stereotypes, and a majority therefore achieved low values on the scale. Approval of traditional orientations was even slightly lower for girls (median=0.26) than for boys (median=1.01).

On the scale with values ranging from zero to four, a majority of adolescents revealed a high degree of body satisfaction. Body satisfaction for boys (with a median value of 3.38) was significantly higher than for girls (median=2.96).
A majority of adolescents reported a high degree of body satisfaction, whereby girls were less satisfied than boys.

Both for role preconceptions and body satisfaction, the differences by sex are statistically significant.

### 3.2 Predicting lower body satisfaction

The results (Table 3) for girls show that the probability of being dissatisfied with physical appearance increases significantly with age and increasing BMI. The value also increases with decreasing family affluence. No association was found with migration background.

Among female respondents, upholding traditional gender roles significantly predicted body satisfaction. Girls with more traditional preconceptions of gender roles were less satisfied with their physical appearance. An increase by one unit on the scale for traditional role orientation was associated with a 30.8% greater risk (odds) for less body satisfaction. Having a less affluent family also increased the risk for a lower level of body satisfaction. No meaningful statistical interaction between gender role and either age or BMI was found for girls (data not shown).

The odds ratio indicates the relationship between the probabilities for dissatisfaction versus satisfaction. The probability itself is easier to interpret. Figure 1 shows the probability of girls being less satisfied with their physical appearance dependent on their age and how strongly they uphold traditional gender role orientations. The results show an increase in the probability of greater body dissatisfaction for 11-year-olds from about 22% for those holding the least traditional views to 47% for those holding the most traditional gender role orientations. The probabilities for 13- and 15-year-old girls were correspondingly higher. For 15-year-olds, the increase in probability was slightly (but not significantly) lower.

### Table 2
Distribution in the sample of traits for which data was collected (n=2,306 girls, n=2,401 boys)*

*Percentage data calculated according to weighted data; absolute figures refer to frequencies in the unweighted sample.

<table>
<thead>
<tr>
<th></th>
<th>Girls</th>
<th>Boys</th>
<th>Total</th>
<th>Significance comparison between groups</th>
</tr>
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<tbody>
<tr>
<td><strong>Traditional gender role preconceptions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean value (SD)</td>
<td>0.56 (0.70)</td>
<td>1.12 (0.96)</td>
<td>0.84 (0.88)</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Median</td>
<td>0.26</td>
<td>1.01</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Interquartile range</td>
<td>0.04–0.95</td>
<td>0.23–1.79</td>
<td>0.103–1.355</td>
<td></td>
</tr>
<tr>
<td>Missing (%)</td>
<td>3.0</td>
<td>4.3</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td><strong>Body satisfaction (BIS)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean value (SD)</td>
<td>2.81 (0.93)</td>
<td>3.22 (0.72)</td>
<td>3.01 (0.86)</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Median</td>
<td>2.96</td>
<td>3.38</td>
<td>3.19</td>
<td></td>
</tr>
<tr>
<td>Interquartile range</td>
<td>2.02–3.56</td>
<td>2.83–3.82</td>
<td>2.52–3.70</td>
<td></td>
</tr>
<tr>
<td>Missing (%)</td>
<td>0.9</td>
<td>1.6</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td><strong>Body Mass Index</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean value (SD)</td>
<td>19.34 (3.72)</td>
<td>19.51 (3.80)</td>
<td>19.42 (3.76)</td>
<td>p=0.164</td>
</tr>
<tr>
<td>Missing (%)</td>
<td>14.1</td>
<td>12.2</td>
<td>13.1</td>
<td></td>
</tr>
</tbody>
</table>

SD = Standard deviation, BIS = Body Investment Scale (value range: 0 to 4), traditional role preconceptions = Attitudes Toward Women Scale (value range: 0 to 4), Missing = missing data.
Body dissatisfaction also increased with age in boys, although this mainly occurred between the 11- and 13-year-old age groups, where the risk (odds) increased by nearly 37%, just as it did with BMI. An increase by one BMI point translated into a 9.4% higher risk (Table 3). However, both associations are less pronounced than for girls. For boys, no meaningful association between migration background or family affluence and body dissatisfaction could be shown. Traditional gender role orientations also had a smaller effect than shown among girls, but were nonetheless statistically significant: an increase by one point in the approval of traditional role orientations increased the odds for greater dissatisfaction with physical appearance by 26.8% among boys.

Table 3 presents the main effects of the reported predictors. Further evaluations also showed a significant interaction between age and gender role among boys, and this is shown in Figure 2: with age, the correlation between traditional role orientation and greater body dissatisfaction decreases among boys. For the group of 15-year-olds, no meaningful relation is found. For a boy from the 11-year-old reference group with an average BMI (relative to age and sex), Figure 2 indicates a predicted probability for greater body dissatisfaction of about 30% for those scoring lowest on traditional role orientation, and around 75% for those with maximum scores for traditional role orientation. In contrast, among 15-year-old boys, the probability varies between 49% and 59%, whereby a more traditional role orientation is even related to a lower probability for dissatisfaction.
Gender role orientation and body satisfaction during adolescence

4. Discussion

During adolescence, the bodies of girls and boys undergo considerable changes. They develop sex specific adult body traits, and during this phase, therefore, preconceptions of typically female and male attributes and behaviours gain increasing personal importance. At this age, conflicts with body image become more frequent too [23]. In many cases, this goes hand in hand with risky health behaviour, i.e. diets, excessive exercise or even eating disorders [24, 25].

Only among boys, there was evidence of an age-dependent association between gender role orientation and body satisfaction.

This analysis has looked at the degree by which traditional gender roles relate to greater body dissatisfaction among girls and boys.

4.1 Associations between gender role orientation and aspects of body image

Adolescents of both sexes in general showed high satisfaction with their body and physical appearance. For other frequently used measures in questionnaires, such as judging body weight, the corresponding levels of satisfaction are
Gender role orientation and body satisfaction during adolescence

The results highlight the relevance of social gender for the prevention of body image problems during adolescence.

considerably lower. In the most recent HBSC study, for example, around half of all girls and boys believed that they were either slightly or far too fat or too thin [51]. Such an assessment of body weight, however, could be less negative than generally assumed. Therefore, adolescents may not consider their weight to be ‘perfect’, but that does not necessarily mean that they reject their physical appearance outright. Moreover, the emotionally charged and in some cases extremely negative statements (‘I hate my body’) used in the scale, in contrast to the question on weight, could provide a further explanation for the more positive results.

Similar to other measures of body image [51], body dissatisfaction was greater among girls and the data confirmed that with rising BMI, the probability of greater dissatisfaction increases, in particular for girls. Here too, there was also a clear increase in dissatisfaction with age, a finding that confirms earlier studies [23, 52], and is often explained by the increase in body fat that is a normal part of puberty for girls.

The results highlight that in both sexes traditional gender role orientations are connected to body image. The more strongly students upheld conservative preconceptions of female and male roles, the greater the probability for them to be less satisfied with their bodies. This applied independently of weight, family affluence, migration background and BMI. However, in boys, this effect decreased with age. Among 15-year-old boys, the association was no longer found and, as a matter of fact, appears to become inverse.

Our results contradict the findings of an earlier analysis, which – unlike many other studies – had asked very similar questions on gender role orientation and body satisfaction [14]. For adolescents in Berlin, the study found that greater adherence to traditional role orientations correlated to greater body satisfaction. This can presumably be explained, at least partly, by the fact that the group of those holding traditional views comprised a particularly high percentage of boys and students of both sexes at lower secondary schools (‘Hauptschule’), who expressed high body satisfaction. The study showed lower values for self-esteem for those with traditional gender orientations, which, like our results, indicates that traditional orientations are related to lower levels of subjective well-being.

The associations found by the HBSC study for girls can potentially be explained by the fact that appearing pretty is a trait traditionally ascribed to females. Girls whose self-image is shaped by this ideal and who believe that being pretty is an important facet of their identity as a woman, would accordingly be more critical if they consider that they deviate from their ideal, and this would create greater dissatisfaction. Such an interpretation is supported by analyses of young women which found that traditional concepts of femininity go hand in hand with a strong desire to be slim [34].

Ideals of masculinity, in contrast, are traditionally focused on other traits than being physically attractive. But typically male-connoted traits would be physical strength and dominance. Not having a strong, muscular body could then cause body dissatisfaction among boys that have internalised and compare themselves to these role expectations.

International research has shown that rigid preconceptions of masculinity cause problems with body image in adult men [43, 53]. A muscular body is thereby seen as a way to express masculinity [29, 41]. Young men that describe themselves as possessing typically male traits thereby less
Gender role orientation and body satisfaction during adolescence

frequently reported problems with body image and eating disorder symptoms [38], whereas those that did not fit the typical male expectations had a higher risk of developing eating disorders [39].

The approach is reductive and based on uniform stereotypical ideal concepts, such as those used by the media and in advertisements that adolescents consume. More nuanced differences in preconceptions of femininity and masculinity by social background are not taken into account here. In future surveys, it would be interesting to conduct a more nuanced analysis of such differences in the ideals adolescents hold. In particular regarding the documented shift in gender roles, such research could prove insightful [17].

At this stage we can only speculate as to why the found relations become weaker in the group of elder boys. Potentially, the desire to fulfil traditional role expectations is stronger in boys of this age in other areas of their lives (such as in their attitudes to risk or sexuality). No data was collected on whether adolescents ascribe masculine traits to themselves. Body developments that come naturally with age (such as a deeper voice and beard growth) could lead boys to perceive themselves as more masculine, correspondingly leading to a decrease in the pressure to conform (or not to conform) to a masculine body ideal.

Looze et al. [4] provide an alternative explanation for the connections to gender role orientations. In an international analysis of the 2009/10 HBSC study, they found that greater gender equality in society was related to a higher satisfaction with life among adolescents of both sexes. This finding was explained empirically through higher levels of social support in countries with higher levels of equality. They concluded that greater gender equality is accompanied by greater recognition of values connoted as feminine, such as tolerance, co-operation, and social support, which would then positively affect well-being in both genders.

Based on this interpretation, less traditional role preconceptions and, related to this, a perceived greater equality between sexes, could increase the perception of tolerance, social support and personal freedom to be who you are. This could decrease the pressure to conform physically to a specific ideal and lead to a greater acceptance of one’s physical appearance. Unlike an explanation that is based on the assumption that different ideals exist for adolescent girls and boys, this interpretation would imply that less obviously perceived differences between the genders affect both sexes through the same mechanism and in an equal manner. This could be underpinned by girls and boys showing similar associations between body satisfaction and gender role orientation.

Ultimately, based on our current analysis, we can only make assumptions on the nature of the correlations found. The hypotheses regarding tolerance and social support could, however, be analysed further with current HBSC data. Whether the described values, thereby, are actually connoted as female would require further analysis.

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Ultimately, based on our current analysis, we can only make assumptions on the nature of the correlations found. The hypotheses regarding tolerance and social support could, however, be analysed further with current HBSC data. Whether the described values, thereby, are actually connoted as female would require further analysis.

Similar to studies that found correlations between levels of gender equality in society and diverse indicators of health and well-being [4–6, 54], we see here that traditional gender role orientations are associated with negative outcomes that are health relevant for both girls and boys. Even though the corresponding correlations do not confirm a causality, the studies mentioned do indicate that it is not only girls and women who benefit from a shift in gender roles. Almost all studies also show that for boys and men, traditional con-
exceptions of gender and gender inequality are accompanied by diverse negative effects on health and well-being.

Thereby, the surveyed adolescents predominantly rejected traditional role conceptions. Regarding this point, no internationally comparable data from the HBSC study is currently available. However, a symmetric distribution of the scale has been reported internationally [44]. The, by contrast, skewed distribution found in Germany, with a majority of adolescents holding less traditional views, as well as Germany’s relatively high scores for gender equality in an international comparison [4, 6], allow us to conclude that traditional role conceptions are probably less pronounced among German adolescents compared, for example, to adolescents from Eastern European countries. It is therefore possible that the scale applied does not allow for adequate differentiation within the group studied. It would be interesting to conduct similar comparisons internationally.

The finding that, in absolute figures, few adolescents hold traditional views with regard to gender, and that the levels for boys are slightly higher, is confirmed by previous national studies [13–16]. The Shell study [55] is the only one to reach a different conclusion; however, this study only asked respondents how they thought employment responsibilities should be shared between a couple, and the methods of data collection are not comparable.

4.2 Strengths and limitations

The strengths of the HBSC study are its large representative sample from across Germany as well as its international comparability. Regarding the interpretation of the findings in this paper, it is nonetheless important to highlight some methodological shortcomings. Cross-sectional data collection does not allow causal links to be established. It is not possible to corroborate that gender role orientation has a causal effect on body image. Moreover, for some values, there are large gaps in the data, in particular for BMI. For comparisons, these analyses were therefore reran without this variable and with a greater number of cases. No meaningful differences were found in the results. As only few adolescents provided high values for traditional role orientation, estimating the probability for greater body dissatisfaction becomes imprecise at the upper end of the scale (broad confidence interval). Furthermore, the questions on a traditional division of roles that appeared in the instrument might already be irrelevant for today’s generation of adolescents in Western Europe. Future analyses should therefore adapt this instrument. A study such as HBSC, which has been designed for international comparative analyses, can invariably live up to its strengths more effectively in international comparisons. Moreover, no comparative values from large-scale studies are available, either for gender role orientation or for the applied scale on body satisfaction, that would enable a clear interpretation of what constitutes a high level of satisfaction or orientation towards traditional values. To ensure better data visualisation, body satisfaction was thus split into two groups along the gender-specific median value. The selection of cut-off values can thereby influence results. Here, the international comparative HBSC results will provide further insights. Further analyses will show how relevant the scale content is with regard to how today’s adolescents view gender roles.
4.3 Conclusions

Our findings indicate that internalised traditional gender roles have consequences for body satisfaction and therefore are a factor in well-being for both sexes during adolescence. Accordingly, an orientation towards classical gender roles appears to be associated with negative consequences that begin to appear even during adolescence. The survey of adolescent role orientation by the HBSC study will allow a future analysis of such interrelations, including for other indicators of health and health behaviour, as well as a further exploration of other possible explanations. Evaluations of international HBSC data allow comparisons to be made between adolescents from different societies where the influence of traditional attitudes varies widely.

From a broader perspective, the results indicate that already in adolescence, greater gender equality could serve for promoting a positive body image as an important indicator of well-being. Questioning stereotypical gender role ideals, which has been proposed as a pillar for the prevention of body image issues among girls [56], could in future also be more widely considered for boys. This supports the public health goal to further decrease gender-related health inequalities.

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Data protection and ethics
Schools and students participated voluntarily in the HBSC study. Information on the aims and contents of the study, and about data protection was provided in writing before the study. Participating students and their parents/legal guardians provided active consent to participate in the study.

The concept for data protection is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The study also received the approval of the Ethics Committee of the General Medical Council Hamburg (processing code PV5671).

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Gender role orientation and body satisfaction during adolescence

Conflict of interest
The authors declared no conflicts of interest.

Acknowledgement
We would like to thank all the schools, teachers, parents and, of course, the students who provided us with valuable information through their participation in the study. Furthermore, we would like to thank all the ministries in the respective federal states for their authorisation of the HBSC study.

References
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Traditional bullying and cyberbullying among children and adolescents in Germany – Cross-sectional results of the 2017/18 HBSC study and trends

Abstract

Bullying is a specific form of violence that can potentially lead to numerous and long-term negative health implications. Despite consistent coverage in the media, particularly on cyberbullying, as of yet there are only few representative findings on the frequency of (cyber)bullying in Germany. This article analyses how widespread bullying and cyberbullying were at schools in Germany in 2018, what differences exist between girls and boys, age groups and various types of schools, and changes in bullying trends between 2002 and 2018. Our findings are based on an analysis of the data provided by the 2017/18 cycle (N=4,347 students, 53.0% female) and previous cycles of the German Health Behaviour in School-aged Children (HBSC) study. In the 2018 cycle, boys reported having bullied other children more frequently than girls, but were bullied just as often. 15-year-olds reported having bullied other children more frequently than girls, but were bullied just as often. 15-year-olds reported having bullied other children more frequently than 11- to- 13-year-olds but reported being bullied less frequently. Students at grammar schools (Gymnasium) least frequently reported any involvement in bullying. Only few children and adolescents reported cases of cyberbullying. Compared to all previous survey years, 2018 saw the lowest number of children that reported having bullied others. However, reports of having been bullied have remained almost stable. The findings highlight the need for evidence-based prevention and intervention anti-bullying programmes and measures across all types of general education schools and age groups.

BULLYING · CYBERBULLYING · FREQUENCY · PREVALENCE · TRENDS · SCHOOL · VIOLENCE

1. Introduction

Bullying describes a specific and repeated form of violence exerted precisely to hurt others. The imbalance of power between bullies and their victims makes it hard for the latter to defend themselves from being bullied [1]. Bullying is an attack on the fundamental right of children and adolescents to respect, safety and physical integrity, as well as to grow up in an environment free of violence. Bullying can entail multiple and severe consequences. It can increase the risk of students underperforming academically or attempting to avoid school altogether, but also makes them more susceptible to depression, suicidality and psychosomatic disorders [2–5]. Longitudinal studies indicate that being bullied during childhood can negatively impact mental health even into adolescence and adulthood [6–8]. Overall, experiences of bullying are one of the chief risk factors for mental disorders [9]. The bullying of children and
adolescents who are victimised because they belong to a cultural, religious or sexual minority (bias-based bullying) can have particularly negative impacts [10, 11]. There are three groups: students who bully others, those who suffer bullying, and those who both bully and are bullied. The latter run a particularly high risk of suffering health impacts [12]. Furthermore, uninvolved students that neither actively bully nor suffer bullying, also play an important role, for example, when they stand by the victims or, otherwise, support the bully [13].

Bullying can take different forms. Generally, studies differentiate between three types: name-calling and insulting (verbal bullying), hitting and kicking (physical bullying), and socially excluding the victim and spreading rumours (relational bullying). Verbal and relational bullying in particular can also be practised online (cyberbullying). We call non-online forms of bullying ‘traditional bullying’ [14].

Suffering online forms of bullying is one of the greatest risks adolescents run when they use the internet [15, 16]. Cyberbullying’s specific modalities (in particular the greater levels of anonymity, widespread use and easy access) contribute to victims feeling less at ease and out of place at school, and increase their risk of developing mental disorders [17, 18]. International studies have thereby shown that relatively few children and adolescents suffer cyberbullying, in particular compared to traditional forms of bullying [14, 15, 17, 19, 20]. According to these studies, far fewer people suffer cyberbullying than media reports would suggest [21, 22]. Representative findings on the prevalence of cyberbullying among students in Germany are rare [20]. For Germany, the representative findings of the 2018 Youth, Information and Media study (JIM) suggests that around one in five adolescents have encountered cyberbullying, which would indicate that cyberbullying is widespread in Germany. However, the study did not collect data on non-online bullying [16].

Meaningful group differences regarding the prevalence of (cyber)bullying exist. Boys appear to bully more than girls [23] – both in terms of cyberbullying [16, 24] and traditional forms of bullying [5, 25, 26, 27] – although the literature provides no consistent results on the differences between the sexes with regard to cyberbullying [28]. Studies mostly show that girls encounter bullying – both traditional bullying [5, 26] and cyberbullying [28] – more often than boys [24]. There are, however, also other findings reporting that boys make up a higher percentage of those students that suffer bullying [23]. Moreover, studies show differences depending on the type of bullying. Boys use verbal and physical bullying more often than girls [29] and also suffer these forms of bullying more frequently [25]. The differences for physical bullying are thereby greater than for verbal bullying [27, 29]. On the other hand, girls appear to both use and suffer relational bullying more frequently than boys, whereby the differences between the sexes here are far smaller than for verbal and physical bullying, with some studies failing to detect such a difference at all [25, 27, 29].

Many studies also indicate school type (see Info box) as a relevant factor for bullying and being bullied. Findings from the German-speaking region show a far greater involvement of lower secondary school (Hauptschule) students in bullying than students at grammar schools (Gymnasien) [30] and intermediate secondary schools (Realschulen) [16, 26]. For a further potential factor, age,
studies have shown that bullying occurs particularly often at the middle school-age range (classes six to nine) [5, 27], whereby German-language studies so far have not reported systematic empirical differences for this age interval [26, 27, 30].

Recent years have seen a considerable drop in bullying both internationally and in Germany [26, 30, 31]. In studies from Germany, the number of girls and boys that report having bullied other children is decreasing [26, 30]. Figures for being bullied are possibly only declining for boys [30]. Furthermore, the decrease in the number of students who bully others [30] or who are bullied is particularly evident among elder adolescents [26].

Our analyses will seek to find out whether the declining trends for bullying and experiences of being bullied have continued in 2018 and whether differences can be discerned regarding sex and age groups. We also conduct a closer analysis of the frequency of bullying and cyberbullying in 2018 regarding overall bullying and experiences of being bullied, the different bullying types, as well as potential differences with regard to sex, age and type of school. Our analyses build on the representative data provided by the 2017/18 cycle of the Health Behaviour in School-aged Children (HBSC) study.

2. Methodology

2.1 Sample design and study implementation

To answer the outlined research questions, we used the 2018 HBSC data for Germany. The data comprised responses given by students from general education schools in Germany from years five, seven and nine. Participating schools were selected by stratified random sampling (stratified by federal state and type of school). Interviews were conducted during lessons via written questionnaires. Participation by schools and students was voluntary and subject to students and their parents/legal guardians providing written consent. The ministries of education and cultural affairs of all federal states approved the study. A total of 4,347 students (53.0% female) at 146 general education schools of all types in Germany participated in the study. The interviewed students were 11 (32.2%), 13 (32.6%) and 15 years old (35.2%) when surveyed. The article by Moor et al. in this issue of the Journal of Health Monitoring contains detailed information on the HBSC study and its methodology.

2.2 Surveying instruments

Bullying in general

Bullying at school was surveyed using the Revised Olweus Bully/Victim Questionnaire (OBVQ) [32]. The questionnaire begins with a short age-appropriate definition of bullying, highlighting the key elements: bullying occurs repeatedly, aims to hurt others and is based on a power imbalance. Students were then asked whether they had bullied others in recent months (How often during recent months have you taken part in bullying at school?) or had been bullied (How often in recent months have you been bullied at school?). Frequencies were recorded based on a five-tier scale (no bullying during the last couple of months, once or twice, two to three times per month, about once per week, several times per week). These two questions served to collect data on general experiences of bullying during
the reference period, whereby bullying was considered to have occurred if students answered at least ‘two to three times per month’.

Types of bullying
The OBVQ [32] also asked students how often they had participated in, or fallen victim to, seven specific forms of bullying during recent months. We can divide these seven types of bullying into three separate categories: physical, verbal and relational bullying. Each type of bullying is thereby represented by a different number of items: physical bullying by one (hitting), verbal bullying by four (name-calling and insulting other students due to their ethnicity, religion or sexual orientation) and relational bullying by two (socially excluding others, lying and spreading rumours). The answer options provided were the same as the five described above. Experience with a particular type of bullying was considered to be present if students had either carried out or experienced at least one of the forms of bullying at least two to three times per month.

Cyberbullying
To survey cyberbullying, we used an adapted version of the revised OBVQ [32]. With one item each, students were asked about cyberbullying (How often have you bullied someone online during the last couple of months?) and whether they had been cyberbullied (How often have you been bullied online during the last couple of months?). Examples of cyberbullying, such as writing mean messages, emails, text messages or posts, creating websites to make fun of someone, or sending unflattering pictures, were provided. Data were collected and categorised using the methods described above both for general experiences of bullying and being bullied as well as experiences differentiated according to the type of bullying.

Control variables
To analyse group differences, we collected data on sex, age group and type of school. Students self-reported sex and age in the questionnaires. Age was categorised by the HBSC Data Management Centre (University of Bergen) during data cleansing, allowing the differentiation of three age groups (11-, 13- and 15-year-olds). To better reflect the situation in all federal states, the survey staff defined four categories for school types: lower, intermediate and grammar schools and mixed school types (e.g. comprehensive schools (Gemeinschaftsschulen), see Info box).

2.3 Statistical analysis
To analyse the frequency of bullying and cyberbullying and the differences between groups for the survey year 2018, a typology was developed that differentiates between students that bully, those that are bullied, and those who fall into both categories (students who both bully and are bullied), as well as uninvolved students that neither bully nor are bullied. This typology was used on bullying in general, types of bullying, as well as cyberbullying. Cross tables and chi-square tests with post-hoc analysis were used to analyse potential differences between groups.

Based on the described typology of bullying roles, the trends for bullying frequency between 2002 and 2018 were analysed by logistic regression with robust standard errors that correct for non-normal distribution and a lack of
independence of data (heteroscedasticity). For analysis, one of the four categories of the typology was opposed with the other three (dummy coding) and then analysed as an independent variable in individual regression analyses. The survey year along with interaction effects between survey year and sex as well as survey year and age group (11-, 13- and 15-year-olds) were incorporated into the analysis as predictors.

All calculations were carried out using a weighting factor that corrects deviations within the sample from the basic population structure (students in Germany) with regard to type of school, age and sex. Cleansing of the raw data set from the German HBSC study was conducted centrally by the HBSC Data Management Centre (University of Bergen). The analyses presented here used SPSS 22 as well as Mplus 8.3. The level of significance of the analysis at the data collection point (2018) was set at \( p < 0.05 \). Trend analyses use a high number of individual comparisons. For these calculations, the level of significance was therefore set at a more conservative \( p < 0.001 \).

3. Results
3.1 Bullying: frequency and differences between groups

Table 1 shows the figures for the different bullying roles according to typology (section 2.3). The vast majority of students reported that they had neither bullied fellow students nor been bullied themselves (uninvolved: 86.7%). Being bullied is an experience reported far more frequently (8.3%) than active bullying (3.9%). Only few students find themselves in the double role of both bullying others and being bullied (1.1%).

<table>
<thead>
<tr>
<th></th>
<th>Uninvolved (%)</th>
<th>Bully (%)</th>
<th>Suffered bullying (%)</th>
<th>Double role bully and bullied (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (N=4,197)</td>
<td>86.7</td>
<td>3.9</td>
<td>8.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Sex (n=4,196)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>88.9</td>
<td>1.8</td>
<td>8.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Boys</td>
<td>84.5</td>
<td>6.0</td>
<td>8.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Age group (n=4,158)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>87.8</td>
<td>2.3</td>
<td>9.0</td>
<td>0.8</td>
</tr>
<tr>
<td>13 years</td>
<td>85.4</td>
<td>3.6</td>
<td>9.3</td>
<td>1.7</td>
</tr>
<tr>
<td>15 years</td>
<td>86.9</td>
<td>5.5</td>
<td>6.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Type of school (n=4,197)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower secondary schools</td>
<td>81.2</td>
<td>5.5</td>
<td>11.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Intermediate secondary schools</td>
<td>83.6</td>
<td>4.7</td>
<td>9.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Grammar schools</td>
<td>91.0</td>
<td>2.4</td>
<td>6.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Mixed school type</td>
<td>84.9</td>
<td>4.6</td>
<td>9.6</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Lower case letters indicate significant differences between subgroups in post-hoc analysis (\( p < 0.05 \)), whereby the differences are significant between subgroups with the same letters. Post-hoc analyses were adjusted for multiple tests (Bonferroni adjustment). Values in lines just over or under 100% are due to the rounding of values after the decimal point.
Chi-square test results show differences in the level of bullying between girls and boys, between 11-, 13- and 15-year-olds, and also with regard to type of school (Table 1). Boys self-report participating in bullying more often than girls, and also more often find themselves in the double role of bully and victim. In terms of falling victim to bullying, no differences between the sexes were found. 15-year-olds are considerably more often bullies than 11- and 13-year-olds, but are less often bullied than 13-year-olds. Students at grammar schools are far less often involved in any bullying role than students at other types of school. For students at lower secondary schools, intermediate secondary school and schools that offer various types of school leaving certificates (mixed school types), no differences regarding bullying experiences were found.

3.2 Physical, verbal and relational bullying: frequency and differences between groups

Analyses for each of the individual types of bullying (physical, verbal and relational bullying) again applied the developed typology of bullying roles (Table 2). Boys reported physically and verbally bullying others more often than girls, with no differences by sex found for relational bullying.

<table>
<thead>
<tr>
<th>Physical bullying (%)</th>
<th>Verbal bullying (%)</th>
<th>Relational bullying (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Uninvolved</td>
<td>Bullies</td>
</tr>
<tr>
<td>Total</td>
<td>95.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Sex</td>
<td>(n=4,121)</td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>96.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Boys</td>
<td>93.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Age group</td>
<td>(n=4,084)</td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>95.3</td>
<td>1.2</td>
</tr>
<tr>
<td>13 years</td>
<td>93.6</td>
<td>1.6</td>
</tr>
<tr>
<td>15 years</td>
<td>96.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Type of school</td>
<td>(n=4,120)</td>
<td></td>
</tr>
<tr>
<td>Lower secondary schools</td>
<td>94.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Intermediate secondary schools</td>
<td>93.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Grammar schools</td>
<td>97.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Mixed school type</td>
<td>93.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Table 2

Physical, verbal and relational bullying by sex, age and type of school (n=2,077 girls, n=2,044 boys)

Source: 2017/18 German HBSC study

Lower case letters indicate significant differences between subgroups in post-hoc analysis (p<0.05), whereby the differences between subgroups with the same letters are significant. Post-hoc analyses were adjusted for multiple tests (Bonferroni adjustment).

Values in lines just over or under 100% are due to the rounding of values after the decimal point.

* Double role bully and bullied

With the exception of relational bullying, where no differences by sex were found, for all other types of bullying, boys reported having bullied fellow students more frequently than girls.
Boys also reported being physically bullied more often than girls, while girls suffered verbal and relational bullying considerably more often than boys. 15-year-olds use verbal bullying considerably more often than 11- and 13-year-olds, while there are particularly low figures for relational bullying among 11-year-olds. When differentiated by type of bullying and by age group, the findings differ from those found for bullying in general: overall, 15-year-olds less frequently report being bullied (Table 1); yet they do not suffer considerably less relational and verbal bullying than 11- and 13-year-olds. Findings for the overall prevalence of bullying, according to which students at grammar schools are least involved in bullying events (Table 1), are confirmed for most types of bullying and bullying roles. Students at grammar schools nonetheless report actively participating in relational bullying just as often as students at other types of schools. Moreover, the small group of students that both exert and suffer physical, verbal and relational bullying is found just as often in grammar schools as at other types of school. While bullying occurs less frequently at grammar schools compared to other types of school, it does still occur in certain forms. No differences were found between lower secondary schools, intermediate secondary schools, as well as schools offering different types of leaving certificates regarding the reported roles of bully and victim, and types of bullying.

### 3.3 Cyberbullying: frequency and differences between groups

We also applied the typology of bullying roles to analyse the prevalence of cyberbullying. The results are shown in

<table>
<thead>
<tr>
<th></th>
<th>Uninvolved (%)</th>
<th>Bullies (%)</th>
<th>Suffered bullying (%)</th>
<th>Double role bully and bullied (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total (N=4,153)</strong></td>
<td>96.0</td>
<td>1.3</td>
<td>2.0</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Sex (n=4,154)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls (n=4,154)</td>
<td>95.9</td>
<td>1.0</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Boys (n=4,154)</td>
<td>96.1</td>
<td>1.6</td>
<td>1.5</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Age group (n=4,113)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>97.4b</td>
<td>0.6</td>
<td>1.7</td>
<td>0.2</td>
</tr>
<tr>
<td>13 years</td>
<td>95.8</td>
<td>0.9</td>
<td>2.4</td>
<td>0.8</td>
</tr>
<tr>
<td>15 years</td>
<td>95.1b</td>
<td>2.4</td>
<td>1.7</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Type of school (n=4,153)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower secondary schools</td>
<td>95.7</td>
<td>1.5</td>
<td>2.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Intermediate secondary schools</td>
<td>94.5g</td>
<td>1.7</td>
<td>2.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Grammar schools</td>
<td>97.8e</td>
<td>0.7</td>
<td>1.2h</td>
<td>0.3</td>
</tr>
<tr>
<td>Mixed school types</td>
<td>94.8h</td>
<td>1.8</td>
<td>2.8h</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Lower case letters indicate significant differences between subgroups in post-hoc analysis (p<0.05), whereby the differences between subgroups with the same letters are significant. Post-hoc analyses were adjusted for multiple tests (Bonferroni adjustment). Values in lines just over or under 100% are due to the rounding of values after the decimal point.
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### 3.4 Prevalence of bullying between 2002 and 2018

The analyses of the trends for bullying figures between 2002 and 2018 are based on the typology of bullying in general (section 3.1). This does not allow for an analysis of cyberbullying, for which data was only first collected in 2018.

Table 4 shows the distribution of bullying roles between 2002 and 2018. Logistic regression analysis with robust standard errors show that in 2018 fewer students reported having bullied others compared to all previous survey years. When examining the proportion of students that reported being a victim of bullying, the figure for 2018 is only lower in comparison to 2006 and has otherwise remained stable. The apparent, slight percentage increase for this group between 2014 and 2018 is therefore not statistically significant. In 2018, the group that reports having bullied others and having been bullied is considerably smaller than in 2002 and 2006, but has remained stable since. Overall, a smaller number of students reported having actively taken part in bullying in 2018 than in 2002, 2006 and 2010. However, between 2014 and 2018 bullying figures did not decrease significantly.

Due to the differences that the 2018 data revealed between the groups of girls and boys as well as between

<table>
<thead>
<tr>
<th>Survey year</th>
<th>Uninvolved (%)</th>
<th>Bullies (%)</th>
<th>Suffered bullying (%)</th>
<th>Double role bully and bullied (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 (n=5,554)</td>
<td>73.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>13.2&lt;sup&gt;d&lt;/sup&gt;</td>
<td>9.5</td>
<td>3.7&lt;sup&gt;i&lt;/sup&gt;</td>
</tr>
<tr>
<td>2006 (n=7,166)</td>
<td>77.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8.8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>11.2&lt;sup&gt;h&lt;/sup&gt;</td>
<td>2.7&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>2010 (n=4,974)</td>
<td>81.4&lt;sup&gt;c&lt;/sup&gt;</td>
<td>8.4&lt;sup&gt;f&lt;/sup&gt;</td>
<td>8.6&lt;sup&gt;g&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>2014 (n=5,682)</td>
<td>83.2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>7.5&lt;sup&gt;f&lt;/sup&gt;</td>
<td>7.8&lt;sup&gt;g&lt;/sup&gt;</td>
<td>1.4&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>2018 (n=4,197)</td>
<td>86.7&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.9&lt;sup&gt;da&lt;/sup&gt;</td>
<td>8.3&lt;sup&gt;h&lt;/sup&gt;</td>
<td>1.1&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Lower case letters indicate significant differences between a specific year and 2018 for the respective bullying role (p < 0.001).
the three age groups, a further analysis focused on whether bullying had also developed differently depending on sex and age group. Further regression analyses therefore set an interaction effect between sex (or age group) and the corresponding surveying year and used this as a predictor next to the respective main effect (sex or age group). 2018 again served as a benchmark for comparisons. The analyses for age categories used the group of 15-year-olds as a benchmark. None of the interaction terms based on the sex of respondents was statistically significant for any of the bullying groups. The development of the trend therefore did not differ for girls or for boys. The trend for the distribution of bullies, bullied and students who find themselves in both roles does not differ between age groups. Significant interaction effects do exist for some groups such as the uninvolved (between the group of 11-year-olds and the group of 15-year-olds, and the years 2006, 2010 and 2018). However, as these are merely isolated findings that are unrelated to the most recent developments between 2014 and 2018, we have not interpreted these findings.

Diverging developments in the prevalence of bullying by type of school were not calculated because changes to education policy have led to considerable shifts in the German education system in recent years. The number of lower secondary schools, for example, has more than halved, dropping from 7,657 in the 2001/02 school year [33] to 3,399 in the 2017/18 school year [34]. These developments too severely limit the reliability of findings for trends specific to school type.

4. Discussion
4.1 Prevalence of bullying and cyberbullying

In 2018, around 13% of participating students in Germany reported having had direct experiences of bullying, either because they had bullied other students, suffered bullying themselves or been active in both bullying roles. Analyses by type of bullying reveal that a particularly large number of children and adolescents were involved in incidents of verbal and relational bullying. Only relatively few children and adolescents reported having physically bullied someone or being physically bullied. The reported figures do not make it possible to differentiate between traditional and cyberbullying. To gain an overview of levels of cyberbullying among 11-, 13-, and 15-year-old students in Germany, the 2018 survey was the first to ask explicitly about experiences of cyberbullying. Around 4% reported either having bullied fellow students or being bullied online. While this makes cyberbullying a relevant problem among students in Germany, the phenomenon is nowhere near as widespread as its prominence in the media and public discourse would suggest [21, 22]. German figures for the prevalence of cyberbullying are similar to those found in international results [14, 19, 20]. However, our results contradict those of the JIM study, which was conducted in Germany [16] and reported far higher levels of cyberbullying. When interpreting these different results, it will be necessary to consider the underlying definitions of bullying and the ways in which it is surveyed. Whereas the JIM study records even single incidents as cyberbullying, for example, our study applied the definition used by Olweus [1], according to which bullying is a repeated experience.
Cyberbullying is often compared to the prevalence of traditional forms of bullying, whereby all forms of bullying that are not explicitly cyberbullying are then considered as traditional forms of bullying. Children and adolescents, however, frequently do not distinguish between online and offline environments in the same way as adults do [35]. Verbal and relational bullying in particular can also be used online. When we ask adolescents about their experiences with different bullying strategies, it is therefore not always clear whether such bullying occurs online or offline. Correspondingly, this article does not compare overall bullying and cyberbullying frequencies. Instead, we consider cyberbullying as a subset within overall bullying frequencies and the reported frequencies for individual types of bullying.

In a similar fashion to the most recent HBSC survey cycles, we based our distinction of the groups analysed (those who bully, are bullied and those active in both roles) on content-based theoretical considerations. Next to this common form of categorisation, there are also empirical approaches to defining groups. A comparison of both approaches shows that the theoretical approach chosen here can lead surveys to overestimate bullying frequency [36]. What is more, cleanly distinguishing between roles is far more difficult, particularly with regard to cyberbullying. In the case of cyberbullying it is rare for an individual to exclusively be a bully or a victim without ever having experienced the role of the other [36]. Moreover, bullying roles appear to be far more complex in cyberbullying than in traditional bullying [37]. The roles described here should therefore be seen as prototypical descriptions that are potentially more complex in practice.

### 4.2 Differences between groups in the prevalence of (cyber)bullying

Boys report bullying others more often than girls. German HBSC data from 2014 had already highlighted this difference between sexes [26]. More recent analyses, however, now show that differences also exist by type of bullying. Girls are just as likely to be actively involved in relational bullying and cyberbullying as boys, a finding corroborated by existing research [25, 27, 29]. However, there are no plausible justifications to explain the differences between the sexes [28]. Entrenched gender role models could lead boys to rely more on physical forms of bullying, while the manner in which girls bully is based more around social relationships [23, 25, 29].

Girls reported suffering cyber and relational bullying more often than boys. Boys, in turn, more frequently reported being physically bullied. However, if we look at bullying in general without differentiating between types of bullying, girls are bullied just as often as boys. This differs from the 2014 HBSC data [26]: findings indicated that more girls had been bullied than boys during this year. It appears bullying has now reached similar levels for both sexes.

Findings on the levels of bullying at different types of schools and years basically confirm the findings of existing German language research. As was the case in previous HBSC study cycles for Germany, in this survey students at grammar schools once again reported that they rarely bullied others or were bullied themselves [26, 30]. Contrary to the survey cycle 2013/14, meaningful differences between intermediate secondary schools and lower
Unlike HBSC data from the survey cycle 2014, as well as earlier surveys with students in Germany [26, 27, 30], considerable differences between age groups existed in 2018. Findings indicate that 15-year-olds are more involved in bullying, but are bullied less than 11- and 13-year-olds. These findings could indicate that students bully others or are bullied outside of their year and age group (for example during breaks). This assumption highlights the need for co-operative school-wide approaches to prevention and intervention that should involve all students at a particular school.

To interpret the data on individual types of bullying, it is important to take into account the specificities of the surveying instrument. The questionnaire used to collect data on bullying is an established instrument that is frequently used internationally and has good psychometric characteristics [38]. However, it differentiates bullying experiences based on theoretical considerations and not empirically grounded. Data for the individual types of bullying are collected using different numbers of items and, potentially, this could influence the results. In addition, the instrument applied in this survey cannot provide findings on currently discussed bullying concepts such as bias-based bullying [10, 11].

4.3 Development of levels of bullying between 2002 and 2018

An analysis of trends shows that in 2018 fewer students reported having bullied other students than in all survey years from 2002 to 2014. With regard to the other bullying roles, we can assume a stabilisation of the frequency of
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behaviour patterns and who therefore are particularly hard to reach through interventions. It is possible that these students bully a number of other students. A small proportion of bullies would then produce a relatively larger proportion of students that are bullied and this would potentially explain the diverging trends.

As it remains impossible to say which of these explanations best fits the results found, it could also be that a combination of the two theories conclusively explains the findings.

4.4 Conclusions

Overall, the decrease or at least stabilisation at a low level of bullying frequencies highlight the importance of proactive anti-bullying interventions. In spite of regressive trends, over one in seven students (both female and male) continues to be involved in bullying. Presumably, therefore, in every single class in Germany, there are children who suffer bullying. The development, evaluation and implementation of school-wide and long-term effective anti-bullying strategies and programmes should therefore be expanded to protect students from bullying and its severe health implications [2–9, 12]. Teachers are key in this regard. They should be supported in their capacity to recognise bullying and react effectively [39, 40]. In particular with regard to the relatively stable number of students that are being bullied, it is important to ensure teachers are made aware of the effects of bullying and encouraged to reach out to external co-operation partners, such as anti-bullying support centres [41].
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Conflict of interest
The authors declared no conflicts of interest.

References

Data protection and ethics
The HBSC study is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The Ethics Committee of the General Medical Council Hamburg assessed the ethics of the HBSC study and provided its approval (processing code PV5671). Participation by all students was voluntary and all students were informed about the aims and contents of the study, and about data protection.

Participating students and their parents/legal guardians provided active consent to participate in the study. Data collection was entirely pseudonymised and no identification of individual participants is possible. Further information on data protection and ethics can be found in the article by Moor et al. in this issue of the Journal of Health Monitoring.
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Traditional bullying and cyberbullying among children and adolescents in Germany


Alcohol, tobacco and cannabis use in adolescence – Cross-sectional results of the 2017/18 HBSC study

Abstract
Tobacco, alcohol and cannabis are psychoactive substances that is often tried for the first time during adolescence and further continued in later life. Regular tobacco and cannabis use as well as alcohol abuse are associated with serious health consequences. According to the importance of health reporting, this article describes current prevalence of adolescent substance use and the associations between psychoactive substance use and specific social determinants. Representative data for Germany from the 2017/18 Health Behaviour in School-Aged Children (HBSC) study among schoolchildren aged 11, 13 and 15 years are used. The article analyses both, the lifetime and 30-day prevalence of tobacco, alcohol and cannabis use (in the latter case, data were only available for 15-year-olds) among adolescents as well as their experiences of alcohol-related misuse (binge drinking). Tobacco and alcohol are used comparatively rarely by 11- and 13-year-olds. However, the prevalence increases significantly among 15-year-olds. In addition, cannabis use is also quite common among this age group. Schoolchildren who do not attend grammar schools are at greater risk of smoking and those with high family affluence are at a greater risk of alcohol use, this applies particularly to girls. Finally, adolescents with a migration background are less at risk of regular alcohol use or binge drinking, but face an increased risk of cannabis use (girls with one-sided migration background). The results indicate that prevention measures should start early, as the prevalence of substance use is significantly higher among older schoolchildren. Depending on the substance, different risk groups can be identified that require particular consideration when drawing up preventive measures.

1. Introduction
In our society, cigarettes and alcohol are ‘common drugs’ that are part of people’s everyday lives. These drugs are legal and have been widespread in our culture for centuries. In contrast, drug policy relating to cannabis remains a contentious issue and debates about it are often conducted on an emotional level [1, 2]. A focus on adolescence is particularly important in this context because people usually come into contact with psychoactive substances during this phase of life for the first time [3, 4]. Young people have to learn – consciously and subconsciously – how to handle these substances. At the same time, adolescents often want to set themselves apart from family or school norms, try out new forms of behaviour, overstep boundaries and experience risk. This leads them to adopt (or perhaps reject) numerous health-related attitudes and behavioural patterns [5].
Alcohol, tobacco and cannabis use in adolescence

adopted in adolescence continue to be practiced throughout adulthood and, therefore, determine future health [6]. Substance use poses a particular problem if it begins very early or if it’s excessive, or if it occurs in combination with other problematic forms of behaviour [7]. Excessive alcohol use is often associated with (fatal) accidents, (sexual) violence, aggression, physical and emotional problems, developmental risks, suicide (attempts), unwanted pregnancies, decline in school performance, truancy and the use of other (illegal) substances [8–13]. At the same time, alcohol abuse and tobacco use are among the key risk factors of morbidity and premature mortality throughout the world [14, 15]. Further, cannabis is the most widespread (illegal) drug used by adolescents in Europe [16], and it poses serious risks to healthy development and coping with the developmental tasks associated with this life stage [17].

During the past 15 years, drastic changes have occurred to the prevalences of substance use. The results from the Health Behaviour in School-aged Children (HBSC) study and the German Health Interview and Examination Study for Children and Adolescents (KiGGS) show clear positive trends for tobacco and alcohol use [18]. The results from the Drug Affinity Study by the Federal Centre for Health Education (BZgA) demonstrate a comparable trend: the proportion of young people aged between 12 and 17 who smoke has declined sharply. In fact, the proportion of smokers decreased from 27.5% in 2001 to 6.6% in 2018. Moreover, the proportion of adolescents who have never smoked was 82.7% in 2018; the highest that it has ever been [19]. The study also found a decline in regular alcohol use and binge drinking among this age group during the past 15 years [20]. Similarly, the HBSC study also found a comparable trend for alcohol use in many Western European countries [21]. Nevertheless, as results from the BZgA illustrate, the data on cannabis use paints a different picture: between 1997 and 2004 lifetime prevalence of cannabis use among 12–17-year-olds increased significantly to 15%; by 2011, the prevalence had dropped to 7%. However, the prevalence has increased again since then, and it was around 10% in this age group in 2018. Boys have more experience with cannabis use than girls (12% vs. 7% in 2018) [22].

Reporting current prevalences of substance use, including stratification by certain risk groups, is important for health monitoring and for verification whether the goals of preventive strategies have been achieved [23]. The regularly generated results from the HBSC study allow to be stratified by wide-ranging social factors and to be compared the data from KiGGS and the Drug Affinity studies, despite the fact that they applied different sample designs. The results of the HBSC study indicate that substance use increases significantly among young people with increasing age. Therefore, it is important to determine which age groups particularly need to be addressed when drawing up preventive measures. Girls and boys also demonstrate different patterns of substance use [24, 25] as well as other social factors such as education level (school type), socio-economic background and ethnic origin also appear to play a role in psychoactive substance use [18–20, 22, 24, 26]. Therefore, this article reports current cross-sectional findings on the prevalence of tobacco, alcohol and cannabis use among 11-, 13- and 15-year-olds. It also examines whether and the extent to which the use of these substances varies by sex, age, school type, family affluence and migration background.
2. Methodology

2.1 Sample design and study implementation

The HBSC study is one of the world’s largest studies of child and adolescent health. It involves the collection of data from young people aged 11, 13 and 15 years every four years. Implementation follows internationally established guidelines. The HBSC study was launched in 1982, and, since then, 50 countries have joined the HBSC network. A total of 45 countries participated in the 2017/18 cycle. Germany began participating in the study in 1994, but only its most populous state, North Rhine-Westphalia (NRW), took part. Since then, other federal states have followed, and the HBSC study has been carried out in all federal states since the 2013/14 cycle. As such, the results are now representative of Germany as a whole. The age groups under study largely correspond to the fifth, seventh and ninth grades in German schools. The study uses a stratified cluster sample, with schools constituting the first unit and school classes the second. The sample is representative for Germany, both in terms of federal state and school type. The 2017/18 survey cycle was conducted using two supplementary samples (one from Brandenburg and one from Saxony-Anhalt) in addition to a full urban sample from the town of Stuttgart. In Germany, the HBSC study was approved in advance by the education ministries of each federal state (with the exception of North Rhine-Westphalia, where the decision lay with the school administration) and, depending on state regulation, in consultation with the state’s data protection officer. Planning and coordination of the standardised survey was carried out by the German team in Halle (Saale), with recruitment undertaken decentrally at all HBSC study locations in Germany. In order to ensure that the survey was standardised in all participating schools, wide-ranging information and instructions were made available to the school and teaching staff for the day of the survey. Detailed information on the methodology applied by the German HBSC study can be found in the article by Moor et al. in this issue of the Journal of Health Monitoring.

2.2 Survey instruments

Indicators of substance use

In order to measure tobacco and alcohol use, schoolchildren were asked on how many days (if any) they had smoked cigarettes or had drunk alcohol. A distinction was made between lifetime prevalence (‘in your entire life’) and current prevalence (‘in the last 30 days’). The seven-step answer scale ranged from ‘never’ to ‘30 days or more’. The study analysed lifetime prevalence (been drunk in your entire life) and the 30-day prevalence (at least once in the last 30 days) and daily smoking (during the last 30 days).

Data on binge drinking was gathered by asking schoolchildren whether they had ever consumed so much alcohol that they had become drunk. The seven-step answer scale ranged from ‘never’ to ‘more than 10 times’ [27]. Once again, lifetime prevalence (been drunk in your entire life) and the 30-day prevalence (at least once in the last 30 days) were obtained.

Data on cannabis use were only collected from 15-year-olds. The adolescents were able to state whether they had ever used cannabis, hashish or marijuana. The seven-step answer scale ranged from ‘never’ to ‘30 days or more’.
Adolescents were said to have a two-sided migration background if a) the adolescent itself was not born in Germany and at least one parent was not born in Germany or b) both parents had moved to Germany and were not born in Germany. In all other cases, the adolescents were categorised as having no migration background.

The respective operationalisation can be found in detail in Moor et al. in this issue of the Journal of Health Monitoring.

2.3 Statistical analysis

The descriptive analyses of tobacco, alcohol and cannabis use are differentiated by sex, age and school type (Table 1 and Table 2). All analyses for cannabis use were based on a sub-sample of 15-year-olds. In order to determine the relationship between substance use and sociodemographic and socioeconomic factors, binary-logistic models were applied once missing values from the respective variables had been excluded. Separate logistic analyses were initially carried out for model 1 that controlled for age, whereas each sociodemographic and socioeconomic variable was controlled for in model 2 (Table 3 and Table 4). The tables include odds ratios (OR) with 95% confidence intervals. The OR provided indicate the factor by which the statistical chance of a health outcome (e.g. regular tobacco or alcohol use and binge drinking) occurring in a particular group is higher than in the reference group. Since this article focuses on risk behaviour, the term ‘risk’ is used rather than ‘statistical chance’ to ensure that the results are more comparable with the literature. The respective reference category is specified in each model. With the exception of...
Alcohol, tobacco and cannabis use in adolescence

The results show that experiences with tobacco, alcohol and cannabis are still widespread.

| Table 1 |
| Tobacco, alcohol and cannabis use by sex (n=2,306 girls, n=2,041 boys)* |

<table>
<thead>
<tr>
<th></th>
<th>Girls</th>
<th></th>
<th>Boys</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td><strong>Tobacco use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(n=4,281–4,285)</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Lifetime prevalence</td>
<td>337</td>
<td>14.2</td>
<td>295</td>
<td>14.8</td>
<td>632</td>
<td>14.5</td>
</tr>
<tr>
<td>30-day prevalence</td>
<td>170</td>
<td>7.0</td>
<td>130</td>
<td>6.3</td>
<td>300</td>
<td>6.7</td>
</tr>
<tr>
<td>Daily</td>
<td>28</td>
<td>1.3</td>
<td>24</td>
<td>1.4</td>
<td>52</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Alcohol use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(n=4,261–4,267)</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime prevalence</td>
<td>897</td>
<td>37.6</td>
<td>822</td>
<td>39.6</td>
<td>1,719</td>
<td>38.6</td>
</tr>
<tr>
<td>30-day prevalence</td>
<td>589</td>
<td>24.3</td>
<td>483</td>
<td>22.9</td>
<td>1,072</td>
<td>23.6</td>
</tr>
<tr>
<td><strong>Binge drinking</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(n=4,267–4,278)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime prevalence</td>
<td>410</td>
<td>17.2</td>
<td>352</td>
<td>17.1</td>
<td>762</td>
<td>17.1</td>
</tr>
<tr>
<td>30-day prevalence</td>
<td>182</td>
<td>7.4</td>
<td>173</td>
<td>8.5</td>
<td>355</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Cannabis use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(15-year-olds only, n=1,468–1,481)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime prevalence</td>
<td>136</td>
<td>15.5</td>
<td>145</td>
<td>22.6</td>
<td>281</td>
<td>18.8</td>
</tr>
<tr>
<td>30-day prevalence</td>
<td>72</td>
<td>8.3</td>
<td>64</td>
<td>10.1</td>
<td>136</td>
<td>9.2</td>
</tr>
</tbody>
</table>

* Percentages are based on weighted data. Absolute numbers of cases are unweighted frequencies.

Calculations of the absolute number of cases, the analyses were carried out using a weighting factor that adjusted for deviations within the sample from the population structure with regard to age, sex, school type and federal state. All analyses were carried out using IBM SPSS 25 and differentiated by sex.

3. Results

Information about the sample distribution in terms of sociodemographic and socioeconomic variables (age, sex, family affluence, school type and migration background) can be found in the article by Moor et al. in this issue of the Journal of Health Monitoring. Table 1 demonstrates that 14.5% of adolescents have smoked a cigarette at least once in their lives and that 6.7% have done so in the past 30 days. Only a very small proportion of adolescents (1.3%) have smoked daily, and, in general, sex-specific differences are small. About over one third of adolescents have tried alcohol at least once in their lives, with almost a quarter having drunk alcohol at least once in the past 30 days. 17.1% have reported experiences with binge drinking (lifetime prevalence), of which 7.4% of girls and 8.5% of boys have done so in the previous 30 days. Among 15-year-olds, 15.5% of girls and 22.6% of boys have used cannabis at least once in their lives, with around half as many have done so in the last 30 days.

Substance use clearly depends on age, and this applies to both sexes (Table 2). At the age of 11, 1.1% of girls have ever smoked, whereas 8.2% of 13-year-old girls and almost one third of 15-year-old girls have done so. 14.8% of 15-year-old girls currently smoke (30-day prevalence), but only a
Differences between the sexes were also identified for cannabis use among 15-year-olds: 15.5% of girls and 22.6% of boys have used cannabis at least once in their lives, and about half of these adolescents are current cannabis users (30-day prevalence).

Since this article focuses on current adolescent substance use, Figure 1 only sets out the 30-day prevalence and does so by school type, family affluence and migration background for girls and boys. Differences are identifiable with regard to tobacco use for both sexes by school type: pupils who do not attend grammar schools smoke more often than those who attend other schools. There are only slight differences by school type for alcohol and cannabis use. Regarding alcohol use, adolescents with high family affluence – and this particularly applies to boys – consume small proportion (3.3%) smokes every day. The prevalences are very similar among boys. With regard to alcohol use, prevalence increases significantly with age, although 4.5% of girls and 12.9% of boys have already tried alcohol by the age of 11. By the age of 13, almost one third of young people have drunk alcohol at least once, whereas the lifetime prevalence is over 70% among 15-year-olds. Around half of 15-year-olds surveyed stated that they had drunk alcohol in the past 30 days. Less than 2% of 11-year-olds reported having experienced binge drinking. 5.3% of 13-year-old girls and 7.8% of 15-year-old boys have been drunk at least once. These figures increase significantly with age: 40.4% of 15-year-old girls and 43.0% of boys of the same age have been drunk at least once in their lives. Of these, 18.4% of girls and 22.8% of boys were drunk at least once in the past 30 days.

**Table 2**

<table>
<thead>
<tr>
<th>Tobacco use</th>
<th>Girls (n=2,273–2,275)</th>
<th>Boys (n=2,008–2,010)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lifetime prevalence</strong></td>
<td>1.1 8.2 30.4 1.3 12.5 31.3</td>
<td></td>
</tr>
<tr>
<td><strong>30-day prevalence</strong></td>
<td>0.7 4.1 14.8 0.0 4.7 14.5</td>
<td></td>
</tr>
<tr>
<td><strong>Daily</strong></td>
<td>0.0 0.3 3.3 0.0 1.3 2.8</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alcohol use</th>
<th>Girls (n=2,262–2,267)</th>
<th>Boys (n=1,999–2,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lifetime prevalence</strong></td>
<td>4.5 29.5 72.2 12.9 34.7 72.5</td>
<td></td>
</tr>
<tr>
<td><strong>30-day prevalence</strong></td>
<td>2.4 13.9 51.7 3.6 14.7 51.9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Binge drinking</th>
<th>Girls (n=2,263–2,273)</th>
<th>Boys (n=2,004–2,005)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lifetime prevalence</strong></td>
<td>1.5 5.3 40.4 1.6 7.8 43.0</td>
<td></td>
</tr>
<tr>
<td><strong>30-day prevalence</strong></td>
<td>0.3 1.8 18.4 0.1 3.1 22.8</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cannabis use (15-year-olds only)</th>
<th>Girls (n=835–840)</th>
<th>Boys (n=633–641)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lifetime prevalence</strong></td>
<td>– 15.5 – – 22.6</td>
<td></td>
</tr>
<tr>
<td><strong>30-day prevalence</strong></td>
<td>– 8.3 – – 10.1</td>
<td></td>
</tr>
</tbody>
</table>

1 At least once in a lifetime
2 At least once in the last 30 days
* Percentages are based on weighted data. Absolute numbers of cases are unweighted frequencies.
alcohol to a greater extent than those with lower family affluence. In contrast, clear differences are identifiable with regard to migration background: pupils with a migration background consume less alcohol but have more experience with cannabis compared to those without a migration background (in the case of girls, this only applies to those with a one-sided migration background).

The associations between tobacco, alcohol and cannabis use and sociodemographic/socioeconomic variables

Logistic regression analyses (Table 3 and Table 4) were used to test the bivariate relationships described above with regard to current substance use (30-day prevalence). Age plays the greatest role in adolescent tobacco and alcohol use, regardless of other sociodemographic and socioeconomic variables.

Schoolchildren who do not attend a grammar school smoke more often, whereas girls with high family affluence are at greater risk of alcohol use.

Figure 1
30-day prevalence of substance use by sex, school type, family affluence and migration background (n=2,306 girls, n=2,041 boys)

Source: 2017/18 German HBSC study
likely to be current smokers as those who do. This relationship is somewhat more pronounced among girls. No differences were identified for alcohol or cannabis use by school type. With regard to family affluence, girls with low family affluence use alcohol significantly less frequently than those who do not. This is not the case for boys. In addition, school type plays a significant role for both sexes when it comes to tobacco (model 2). Adolescents who do not attend a grammar school are twice as likely to be current smokers as those who do. This relationship is somewhat more pronounced among girls. No differences were identified for alcohol or cannabis use by school type. With regard to family affluence, girls with low family affluence use alcohol significantly less frequently than those who do.

### Figure 1 Continued

30-day prevalence of substance use by sex, school type, family affluence and migration background (n=2,306 girls, n=2,041 boys)

Source: 2017/18 German HBSC study
Adolescents with a migration background have a lower risk of regular alcohol use or binge drinking but face an increased risk of cannabis use (girls with one-sided migration background).

Table 3
Logistic regression models for current substance use (30-day prevalence) by sociodemographic/socioeconomic variables for girls (tobacco and alcohol use n=2,306, binge drinking n=1,811, cannabis use n=828)
Source: 2017/18 German HBSC study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tobacco use</th>
<th>Alcohol use</th>
<th>Binge drinking</th>
<th>Cannabis use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other school types</td>
<td>2.38 (1.49–3.79)</td>
<td>2.49 (1.56–3.99)</td>
<td>0.94 (0.72–1.22)</td>
<td>1.09 (0.83–1.43)</td>
</tr>
<tr>
<td>Family affluence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>0.85 (0.53–1.36)</td>
<td>0.82 (0.51–1.31)</td>
<td>0.74 (0.54–1.02)</td>
<td>0.75 (0.55–1.03)</td>
</tr>
<tr>
<td>Medium</td>
<td>0.79 (0.44–1.40)</td>
<td>0.72 (0.40–1.29)</td>
<td>0.38 (0.25–0.58)</td>
<td>0.41 (0.27–0.62)</td>
</tr>
<tr>
<td>Low</td>
<td>0.79 (0.44–1.40)</td>
<td>0.72 (0.40–1.29)</td>
<td>0.38 (0.25–0.58)</td>
<td>0.41 (0.27–0.62)</td>
</tr>
<tr>
<td>Migration background</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-sided</td>
<td>0.96 (0.55–1.67)</td>
<td>0.90 (0.51–1.57)</td>
<td>0.49 (0.33–0.72)</td>
<td>0.48 (0.32–0.72)</td>
</tr>
<tr>
<td>Two-sided</td>
<td>0.82 (0.52–1.29)</td>
<td>0.77 (0.48–1.22)</td>
<td>0.42 (0.31–0.57)</td>
<td>0.44 (0.32–0.60)</td>
</tr>
</tbody>
</table>

OR = odds ratio, Ref. = Reference, CI = confidence interval, bold print = significant values (p <0.001)
*Model 1 = age-adjusted (except for cannabis use as only data from 15-year-olds were included)
**Model 2 = adjusted for age, school type, family affluence and migration background

with high family affluence. This difference is also identifiable among boys (model 1), but not by school type or migration background (model 2). No further relationships were identified between family affluence and other substances. However, differences were found for migration background, particularly among girls. Girls with a one- or two-sided migration background have a lower risk of alcohol use or of experiencing binge drinking. The same applies for alcohol use by boys with a migration background; however, when it comes to binge drinking, only boys with a two-sided migration background did not get drunk as often as those with a one-sided or no migration background. Girls with a one-sided migration background are twice as likely to be current cannabis users as adolescents with no migration background. No similar association was identified among boys.
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**Table 4**
Logistic regression models of current substance use (30-day prevalence) by sociodemographic/socioeconomic variables for boys (tobacco and alcohol use n=2,041, binge drinking n=1,618, cannabis use n=623)
Source: 2017/18 German HBSC study

<table>
<thead>
<tr>
<th></th>
<th>Tobacco use</th>
<th>Alcohol use</th>
<th>Binge drinking</th>
<th>Cannabis use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
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<tr>
<td><strong>Age group</strong></td>
<td></td>
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<tr>
<td>11 and 13 years</td>
<td>Ref.</td>
<td>Ref.</td>
<td>Ref.</td>
<td>Ref.</td>
</tr>
<tr>
<td></td>
<td>22.38 (12.96–38.67)</td>
<td>22.38 (12.94–38.71)</td>
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</tr>
<tr>
<td><strong>School type</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Other school types</td>
<td>1.94 (1.20–3.12)</td>
<td>1.91 (1.18–3.09)</td>
<td>0.98 (0.75–1.29)</td>
<td>1.10 (0.83–1.46)</td>
</tr>
<tr>
<td></td>
<td>22.38 (12.94–38.71)</td>
<td>22.38 (12.96–38.67)</td>
<td></td>
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</tr>
<tr>
<td><strong>Family affluence</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>1.08 (0.61–1.92)</td>
<td>1.01 (0.56–1.80)</td>
<td>1.02 (0.72–1.43)</td>
<td>1.06 (0.75–1.51)</td>
</tr>
<tr>
<td></td>
<td>1.32 (0.90–1.84)</td>
<td>1.32 (0.90–1.84)</td>
<td>1.32 (0.90–1.84)</td>
<td>1.32 (0.90–1.84)</td>
</tr>
<tr>
<td>Low</td>
<td>1.55 (0.84–2.87)</td>
<td>1.42 (0.76–2.67)</td>
<td>0.66 (0.44–0.99)</td>
<td>0.81 (0.54–1.24)</td>
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<tr>
<td></td>
<td>0.80 (0.38–1.67)</td>
<td>0.80 (0.38–1.67)</td>
<td>0.80 (0.38–1.67)</td>
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</tr>
<tr>
<td><strong>Migration background</strong></td>
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<tr>
<td>None</td>
<td>Ref.</td>
<td>Ref.</td>
<td>Ref.</td>
<td>Ref.</td>
</tr>
<tr>
<td>One-sided</td>
<td>1.08 (0.56–2.08)</td>
<td>1.06 (0.55–2.05)</td>
<td>0.51 (0.33–0.80)</td>
<td>0.52 (0.33–0.82)</td>
</tr>
<tr>
<td></td>
<td>1.39 (0.63–3.08)</td>
<td>1.39 (0.63–3.08)</td>
<td>1.39 (0.63–3.08)</td>
<td>1.39 (0.63–3.08)</td>
</tr>
<tr>
<td>Two-sided</td>
<td>0.95 (0.59–1.52)</td>
<td>0.83 (0.51–1.53)</td>
<td>0.31 (0.22–0.44)</td>
<td>0.32 (0.23–0.45)</td>
</tr>
<tr>
<td></td>
<td>0.60 (0.38–0.94)</td>
<td>0.60 (0.38–0.94)</td>
<td>0.60 (0.38–0.94)</td>
<td>0.60 (0.38–0.94)</td>
</tr>
</tbody>
</table>

OR = odds ratio, Ref. = Reference, CI = confidence interval, bold print = significant values (p<0.001)
* Model 1 = age-adjusted (except for cannabis use as only data from 15-year-olds were included)
** Model 2 = adjusted for age, school type, family affluence and migration background

4. Discussion

**Summary of results**
The results of the HBSC study show that experiences with tobacco, alcohol and cannabis are still widespread, especially among 15-year-olds. With the exception of cannabis, no significant sex-specific differences were identified for substance use. In contrast, clear age-dependent differences were found for alcohol and tobacco. Whereas the proportion of 11-year-olds who consume tobacco is rather low, both lifetime prevalence and current use (in the past 30 days) increase significantly among 13-year-olds and particularly among 15-year-olds. Almost a third of girls and boys have tried cigarettes by the age of 15. Almost every sixth adolescent is a current smoker (30-day prevalence), but only about 3% smoke daily. The higher proportion of
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users among both girls and boys with increasing age is particularly noticeable with alcohol, which has a higher overall prevalence than tobacco. Over 70% of 15-year-olds have drunk alcohol at least once, with every second adolescent having done so at least once in the past 30 days. Around 40% of adolescents had already been drunk by this age; about half of them had been at least once in the last month. Every sixth girl and every fifth boy has experienced cannabis by the age of 15; half of these adolescents currently use cannabis (in the past 30 days). The study found heterogeneous results for school type and family affluence. The multivariate analyses for current (30-day) substance use only identified significant differences for tobacco use by school type: adolescents who do not attend a grammar school smoke more often than those who do. Nevertheless, schoolchildren with high family affluence have a higher risk of alcohol use, and this is particularly the case with girls. However, this relationship was no longer identified after controlling for age, school type and migration background. In addition, girls and boys with a migration background have a lower risk of alcohol use or binge drinking, but girls with a one-sided migration background have an increased risk of cannabis use.

Comparison and interpretation of the results

The results for Germany from the 2017/18 HBSC study largely coincide with those of other studies of substance use, such as the drug affinity studies by the Federal Centre for Health Education (BZgA), the European School Survey Project on Alcohol and Other Drugs (ESPAD), the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) and the international HBSC results [16, 18–22, 26, 34]. The age-specific differences in substance use reported here were also found by previous studies and can be explained by the developmental tasks and characteristics typical of adolescence, such as the adolescents’ desire to increasingly distance themselves from their parents, try out risky behaviour and overstep boundaries – especially as part of a peer group. As such, the risk of risky behaviour such as substance use increases sharply during this time [5, 35]. Other studies have also found sex-specific differences for alcohol, with higher levels of alcohol use among boys [16, 25, 36]. In the last nationwide HBSC survey, differences in tobacco use (such in regard to school type) were also observed. These results showed that girls who attended a lower secondary school (‘Hauptschule’) smoked twice as often as boys from the same type of school [24]. However, the current study only found slight sex-specific differences.

Results by school type, family affluence and migration background

The multivariate results presented in this article from the 2017/18 survey demonstrate school-specific differences for tobacco use only. Comparable results have also been identified by previous studies [24, 26, 37]. The association between education and tobacco use can be attributed, among other things, to the fact that tobacco prevalence is higher on non-grammar schools and that young people with a majority of friends who are smokers are more likely to smoke [38, 39]. However, no differences in tobacco use were found for family affluence. In fact, the results show that tobacco use is particularly associated with indicators of socioeconomic status that are closest to young people’s
living environments (e.g. achievement at school and school type) and that these show a stronger relation to smoking behaviour than parental indicators of socioeconomic status [37]. The results also demonstrate that smoking behaviour is often highly influenced by peer group composition and school setting (school type) [40].

In contrast to the results for tobacco, higher lifetime alcohol prevalence was found among schoolchildren from socially better off families. Girls with low family affluence less often drink alcohol than those with high family affluence. However, the prevalence of current alcohol use and binge drinking are lower for grammar school pupils than for those who attend other types of school. However, the school type specific results could not be confirmed in the multivariate results. This heterogeneous relationship between family affluence, education and alcohol has also been observed internationally by several other studies [21, 41, 42]. A possible explanation could be that the first contact with alcohol often takes place in the family setting, whereas the first experiences with tobacco are largely made together with friends. Other studies indicate that alcohol is more freely available in families with higher family affluence, which means that adolescents from these families can consume alcohol more often; however, they do so more moderately, since they remain under the supervision and control of their parents [43].

The HBSC results also demonstrate that migration background plays a role in the prevalence of alcohol use. The results for both sexes show that schoolchildren with a one- or two-sided migration background try alcohol less frequently, are less likely to use it currently, and experience binge drinking less often (among boys this only applies to those with a two-sided migration background). This can be explained by cultural differences in consumption patterns, such as the fact that the liberal drinking culture in Germany treats alcohol as a common part of any celebration, a pattern that is extremely different to the picture painted in other cultures. For example, since their value system tends to advocate a culture of abstinence, the cultural and/or religiously-influenced backgrounds of adolescents from Arab countries of origin are encouraged to avoid alcohol and other drugs [44, 45].

Strengths and limitations
The results are based on a large representative sample of adolescents aged 11, 13 and 15 years in Germany. The HBSC study uses validated and comprehensive items to assess the use of various substances and their related social determinants. Despite these strengths, the study also has a number of limitations.

The current HBSC study did not record any information on the patterns of consumption found among the participants’ family or friends. This is important because other studies have shown that these patterns have a decisive influence, in particular, on smoking behaviour but also on alcohol use in adolescence [39, 40]. Nor did the survey ask any questions about the use of e-cigarettes or water pipes (shishas), which have recently gained in popularity and are also linked to health risks [46, 47]. The HBSC results demonstrate differences according to migration background for alcohol use, but these, among other things, could not be assigned to any particular ethnic group due to the low number of cases in specific ethnic groups and for data protection reasons. As people with
a migration background constitute a highly heterogeneous group, future studies could conduct a more detailed analysis of these differences. Despite these limitations, school surveys such as the HBSC remain one of the most important and robust methods of measuring substance use by adolescents and for obtaining valid and informative data in this area [48, 49].

Conclusions for prevention
The following conclusions for preventive measures can be derived from the results set out above: 1) since substance use increases significantly from the age of 13, prevention should be started as early as possible; 2) tobacco prevention measures should particularly be aimed at schoolchildren who do not attend grammar schools; 3) measures promoting the responsible use of alcohol should address all socioeconomic status groups but primarily adolescents from better off families. Finally, 4) cannabis prevention measures should increasingly target girls and boys with a migration background.

Although studies have identified a significant decrease in tobacco and alcohol use in Germany [18, 26, 50] and internationally [21, 51], the results indicate that substance use is still popular in adolescence. Importantly, longitudinal studies confirm that smoking behaviour remains relatively stable during the transition from adolescence to young adulthood. As such, the majority of adolescent smokers will continue to smoke in adulthood, whereas non-smokers will continue to refrain from tobacco use in adulthood [52]. Therefore, it is important that prevention begins early and aims for abstinence or at least the reduction of tobacco use. When it comes to alcohol, moderate alcohol use is often advised. However, there is also evidence that abstaining from alcohol is the healthier option, since moderate alcohol use also increases mortality [53]. It has long been discussed whether and the extent to which cannabis can be considered an entry drug into other illegal psychotropic substances and problematic patterns of consumption. Increasing numbers of studies have confirmed this trend and the fact that tobacco and alcohol use in adolescence is associated with an increased risk of problematic substance use in adulthood [54].

A large number of different factors from the adolescents’ social contexts, such as other family and school determinants (family structure, parent-child relationship, pressure at school, school environment and support at school) have proven relevant for substance use [55]. School is a particularly important setting for initiating health-promoting measures. All children and adolescents can be accessed via schools, which can either promote substance use or act as an obstacle to it. A comprehensive review of the effectiveness of school-based interventions aimed at preventing or reducing substance use concludes that school programmes that boost self-confidence and take peer resistance into account (resisting peer pressure) are more successful than prevention measures that do not. Interventions that are based on several components and include different levels (and so go beyond the individual level to include organisational changes) are more effective, especially with regard to alcohol and cannabis use [56]. The BZgA also emphasises the role of the school, alongside the family and policy level in preventing substance use. Measures that are merely aimed at providing information (such as educational programmes that provide health education) or affective
elements and non-interactive measures are less effective than interactive programmes that take the social influence model into account (e.g. the peer group) as well as life skills. This applies regardless of the substance in question [57].

In summary, substance use, especially among older schoolchildren, is still widespread. Despite the decline in tobacco and alcohol use, health promotion and prevention measures should continue to apply across the board. Finally, the school setting is particularly suitable for establishing health-promoting and preventive measures, but it is essential that these measures are age-appropriate and reflect the needs of target groups [58].

Data protection and ethics
The survey was strictly confidential and conducted in strict compliance with data protection regulations. Prior to the study, a concept for data protection was developed jointly with the data protection officer of Martin Luther University Halle-Wittenberg.

The concept for data protection is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The study also received the approval of the Ethics Committee of the General Medical Council Hamburg (processing code PV5671).

Participation in the study was voluntary at school and student level, meaning that the school and the adolescents could refuse to participate or revoke their consent until the day the survey was to take place. All students were free to end their participation in the survey at any time and only to fill out individual questions on the questionnaire. Written active consent for participation in the study was obtained from both the legal guardians and the students and this was checked by the teachers.

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References


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The 2017/18 Health Behaviour in School-aged Children (HBSC) study – Methodology of the World Health Organization’s child and adolescent health study

Abstract

The Health Behaviour in School-aged Children (HBSC) study is an international research project in collaboration with the World Health Organization (WHO) for over 35 years. HBSC is the largest study on child and adolescent health and one of the most important sources of data for the WHO’s international comparative health monitoring. Every four years, data on the health and health behaviour of students aged 11, 13 and 15, as well as the social contexts and conditions for growing up healthy, are collected. A total of 50 countries belong to the HBSC network, with 45 countries taking part in the 2017/18 survey. Germany has contributed to the HBSC surveys since 1993/94. For the most recent 2017/18 cycle, students at 146 schools in Germany were interviewed (response rate of schools: 15.6%). A net sample of n = 4,347 girls and boys was achieved for Germany (response rate: 52.7%). Participation was voluntary and the survey was conducted in German school years five, seven and nine (corresponding to ages 11, 13 and 15). A weighting procedure was applied to allow for representative findings on the health of children and adolescents in Germany. HBSC offers a valuable contribution to health monitoring and provides numerous starting points to identify needs, risk groups and fields of action to initiate targeted and actual needs-based measures of prevention and health promotion in the school setting.

1. Background

HBSC – The international World Health Organization study

For adult-age health, childhood and adolescence are determining life phases. A string of publications in the journal ‘The Lancet’ [1–4], as well as reports by the World Health Organization (WHO) [5–9] and the United Nations Children’s Fund (UNICEF) [10–13] all highlight the relevance of child and adolescent health for public health policies and practice, and science’s mandate to provide an encompassing data basis to support decision makers in developing health promotion and prevention measures.

Considering the number of participating countries, the Health Behaviour in School-aged Children study – abbreviated to HBSC – is one of the world’s largest studies on child and adolescent health, and an important basis of data for international comparative health reporting in childhood and adolescence by the WHO [9, 14]. The study aims to provide data on the health and health behaviour of students...
The HBSC study is one of the largest global studies on child and adolescent health, and one of the most important data foundations for WHO health reporting within the WHO Europe region.

In terms of Germany’s involvement, the most populous federal state of North Rhine-Westphalia first took part in the 1993/94 cycle of the HBSC study. In the 1997/98, 2001/02 and 2005/06 cycles, Saxony, Hesse, Berlin, Thuringia and Hamburg also took part. With the exception of Baden-Württemberg, all federal states then took part in the 2009/10 cycle. Since the 2013/14 cycle, all 16 federal states have collected data. The current 2017/18 cycle was conducted with two supplementary samples in Brandenburg and Saxony-Anhalt, as well as a complete urban survey for the city of Stuttgart (Figure 1).

Figure 1
Number of countries in the HBSC network and participation of Germany by survey cycle
Source: Own diagram

NRW = North Rhine-Westphalia
The 2017/18 HBSC cycle in Germany was accomplished by the following universities: Martin Luther University of Halle-Wittenberg (managed and co-ordinated by Prof. Dr Matthias Richter); Brandenburg University of Technology Cottbus-Senftenberg (Prof. Dr Ludwig Bilz); Heidelberg University of Education (Prof. Dr Jens Bucksch); University of Bielefeld (Prof. Dr Petra Kolip); Eberhard Karls University Tübingen (Prof. Dr Gorden Sudeck); and the University Medical Center Hamburg-Eppendorf (Prof. Dr Ulrike Ravens-Sieberer).

The HBSC study has three main strengths: 1) the international comparability of data; 2) the potential to analyse trends and contributions to health monitoring; and 3) the availability of representative and broad data on child and adolescent health and health behaviour, as well as on factors from the social and school environments that potentially influence health. HBSC can therefore provide an important contribution to health monitoring as well as to national and international health targets. This information offers the scope to identify risk factors and fields of action, shed light on currently unmet needs and to indicate focuses for prevention and health promotion, particularly in the school setting [15].

2. Methodology

2.1 HBSC topics and HBSC instruments

For the HBSC study, self-reported data of adolescents across Germany are collected via a questionnaire (paper-and-pencil method). The social determinants of health and health behaviour were focus of the questionnaire. HBSC is conducted using standardised, internationally co-ordinated guidelines in all participating countries [6, 9]. To ensure international comparability, the same core questionnaire is used in all countries. In addition, depending on a country’s respective interests, further optional modules exist which can be used. All questions are continuously developed and validated. For the current survey cycle, the German questionnaire was tested in a national pre-test in two school classes of 11-year-old children (school year five in Germany) at two different school types (secondary school (‘Oberschule’) and grammar school (‘Gymnasium’), Info box). The ‘Oberschule’ is a special type of school in Saxony. ‘Oberschulen’ bring together lower secondary and intermediate secondary education under one roof and are oriented towards occupational training’ [16].

Based on the pre-test, it was examined how long it took for students to complete the questionnaire and ambiguities with regard to the wording as well as issues related to how readily understandable the questions were noted. Some difficulties were solved by introducing short notes explaining the questions, yet without changing the validated items themselves. For this, the international HBSC study group regularly detects important issues for adolescents (via the Youth Engagement Advisory Group) and uses this information to further develop the study. The international protocol, which can be obtained on demand from the HBSC study group, contains detailed information on methodology, items and scales, as well as validation [6, 17]. Table 1 provides an overview of the topics covered by the survey.
**CONCEPTS & METHODS**

The 2017/18 Health Behaviour in School-aged Children (HBSC) study

2.2 Survey design and sample

HBSC is designed as a cross-sectional study. The target populations are children and adolescents in the age groups of 11, 13 and 15 with a mean deviation of 0.5 years. In Germany, these age groups correspond roughly to school years five, seven and nine. According to the HBSC guidelines, the target number of participants per age group is \( n=1,500 \), leading to a total net sample of \( N=4,500 \).

Germany’s national sample is a cluster sample, which means that surveying units are primarily schools and, secondly, school classes. Sampling was conducted using the IBM SPSS Statistics 25 software with a PPS design (probability proportional to size) which took into account school size and the distribution (in percentage) of students for the included grades in the corresponding federal state, stratified by type of school. The culture and/or education ministries of each federal state were asked to provide the most up-to-date list of all types of general education schools in the respective federal state. Privately run schools and schools for children with special needs were not considered. Based on these lists of schools, a sample was drawn that corresponds to the percentage distribution of students by federal state, type of school, grade and sex. Federal states with large populations and a correspondingly high number of students, such as North Rhine-Westphalia and Bavaria, are represented with a higher percentage (in line with the federal distribution) than federal states with considerably fewer students (such as Bremen or Saarland). In a second step, based on the percentage distribution of students at the different school types in each state, the required number of schools was then randomly selected. Where this information was available, sampling took into account the size of schools and the number of students in the relevant grades. Due to low response rates in some federal states, further samples were drawn where necessary.

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### Compulsory fields of the core questionnaire (mandatory packages)

- **Sociodemographic data**
  - on factors such as sex, age, family structure, migration background, indicators of family social standing (family affluence)
- **General health indicators**
  - for example on subjective health and well-being, physical and mental health
- **Health and risk behaviour**
  - on factors such as substance use, physical activity, media use, dietary habits, bullying and violence, as well as sexual behaviour (only 15-year-olds)
- **Social contexts**
  - for example questions regarding family (i.e. family support), school (class environment, school burdens, support by teachers and students), peers (for example quality of relationships)

### Optional question modules for Germany (optional packages)

- Gender role orientation
- Measures to control weight and body satisfaction
- Health literacy
- Symptoms of depression and stress

---

**Table 1**

**Topics within the HBSC questionnaire**

Source: Inchley et al. (2018) [6], HBSC International Coordinating Centre (2020) [17]
Considering the experiences gained from previous HBSC cycles and based on other school surveys, a response rate of 20% for schools and 70% for students in Germany was anticipated. These estimates already took into account that participation rates could be lower than during the 2013/14 HBSC cycle. In order to avoid distortions and ensure the international comparability of data, data cleaning eliminated students from the data set who were either more than six months older or younger than the surveyed age groups of 11-, 13- and 15-year-olds. Next to response rates, a 20% buffer for this data cleaning was taken into account to ensure the necessary size of the sample.

2.3 Recruiting schools and survey implementation

In Germany, the HBSC study was approved in advance by the education ministries of each federal state (with the exception of North Rhine-Westphalia, where the decision lay with the school administration) and, depending on state regulation, in consultation with the state’s data protection officer. The German survey team in Halle planned and co-ordinated the standardised survey, while school recruitment was conducted de-centrally at all HBSC survey locations in Germany.

All randomly drawn schools received a letter from the German national HBSC team inviting them to participate in the survey. Schools that did not respond to this letter were contacted again, either through a further letter or a telephone call. Participating schools received the interview materials and an information flyer in advance to provide teachers, parents and students with a broad basis of information on the study. Details on the content of the study, data protection and contact persons were provided. In case of any questions, all study participants (schools, teachers, parents and students) could contact the national HBSC team, as well as receive information on the study website, where, with the appropriate password, they could also access the questionnaire.

At each participating school, a fifth-, seventh- and ninth-year class was invited to take part. Schools randomly selected classes for participation. In order to standardise surveying at schools, schools and teachers received detailed information and instructions for the survey day. Schools and especially teachers decided the date on which the survey would take place depending on activities already scheduled at their schools. Students who provided the consent of their legal guardians and wished to take part were handed out the questionnaire in class. In addition to the questionnaire, participants received an empty envelope with university stamp into which they placed the questionnaire after completion, sealing the envelope before collection. All data was surveyed anonymously. Filling out the questionnaire took around 45 minutes. Collected questionnaires were sent with pre-addressed packages to the national HBSC centres. Specific regulations of the ministry of education in Saxony meant that surveying there was conducted by members of the HBSC team. Data was surveyed in all federal states between February and September 2018.

2.4 Data protection and ethics

The survey was conducted anonymously and developed to comply with the EU’s General Data Protection Regulation (GDPR) and Germany’s Data Protection Act (BDSG).
A corresponding concept was developed with the data protection officer of Martin Luther University Halle-Wittenberg. Furthermore, the study received the approval of the Ethics Committee of the General Medical Council Hamburg (processing code PV5671). Participation in the study was voluntary for schools and students. Schools, children and adolescents could refuse to participate or withdraw their consent until the day of the survey. Moreover, all participating students were free to cease filling out the questionnaire at any moment, or to answer only selected questions. Active consent to participate in the study was sought from parents or legal guardians and students which was checked by teachers. Schools participated in the study at no financial cost. An external services provider conducted data entry for all federal states centrally based on standardised provisions and quality-assured procedures, such as entering the data twice and pre-defining valid entries. Following quality assurance, the services provider shredded questionnaires.

It is impossible to identify schools or individual students using the data as no names were associated to the questionnaire data. To ensure the total pseudonymisation of the data provided, the list of participating schools was eliminated from the random sample immediately after the completed questionnaires were received. Schools shredded the active consent forms received from parents or legal guardians and students at the end of the survey in accordance with Germany’s DIN norm 6639.

### 3. Response and representativeness

#### 3.1 Comparisons between the unadjusted and adjusted gross samples

Applying standardised procedures, the Data Management Center in Bergen cleaned the data received from a total of 6,097 students in Germany. Students outside of the accepted variance of ±0.5 years from the realised sample of 11, 13 and 15 years were excluded. A small number of further cases were excluded because no sex was reported. A total of n=1,750 cases (28.7%) were removed from the data set. These cases can be considered as quality neutral losses. The net sample therefore consisted of n=4,347 girls and boys.

#### 3.2 Case numbers and response rates

Overall, 146 schools were included in the HBSC study, which corresponds to an average response rate among schools of 15.6%. The response rate for students was 52.7% on average. Depending on the federal state, response rates between 39.2% and 76.3% were achieved on student level. Other health surveys concerning schools have achieved similar or higher response rates for schools and students [18]. Compared to previous HBSC study cycles, the response rates of schools, and of students in particular, have decreased. The main reasons stated by schools – either in writing or by phone – were that they lacked the capacities, had too few teaching staff due to high rates of sickness, had already agreed to participate in other studies, or they pointed to the increasing number of requests to participate in studies they had received in recent years. The reasons
most frequently stated for non-participation by students were sickness, lack of interest or the absence of consent from parents or legal guardians. Europe’s new general data protection regulation also caused a certain level of uncertainty and reservations, in particular among parents. A certain degree of ‘survey fatigue’ was also observed due to the increasing number of surveys among students at schools. A further problem was that for parents without sufficient proficiency in German, the information flyer was hard to understand. These problems and reasons for non-participation were also expressed in other studies and/or surveys at schools [19].

### 3.3 Composition of the realised sample

The final data set was compiled via a multi-step process. At first, partial samples from the representative samples for Brandenburg, Saxony-Anhalt and the city of Stuttgart were integrated into the national data set. This national data set was then processed by the HBSC Data Management Centre (DMC) at the University of Bergen in Norway. Following a set and standardised procedure, the national data of all participating HBSC countries was tested for incorrect entries (particularly with regard to age) and cleansed. A harmonisation of age groups enables international comparisons. Table 2 provides information on the

<table>
<thead>
<tr>
<th>Federal State</th>
<th>Schools, total (n)</th>
<th>Students, total (n)</th>
<th>Students, total (%)</th>
<th>Students, sex (n)</th>
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<td><strong>100</strong></td>
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<td></td>
<td></td>
<td><strong>2,041</strong></td>
</tr>
</tbody>
</table>

*Absolute number of cases unweighted, percentages weighted
3.5 Operationalisation of sociodemographic and socio-economic variables

Student’s age was operationalised through the data provided in the survey on year and month of birth. Plausibility checks were used to complement data from students who failed to report their age based on the data provided on school year. School year was also surveyed and students could answer either five, seven or nine. Sex was surveyed by asking whether the respondent was a girl or a boy.

To operationalise the socioeconomic status of adolescents, a number of indicators, such as type of school, and the family affluence of children and adolescents, were used. Type of school was not surveyed, this data was provided by the schools themselves when they sent back the survey questionnaires. Due to the highly heterogeneous nature of school forms across all federal states, these were categorised into either four (grammar, intermediate and lower secondary schools, as well as mixed forms), or two groups (grammar schools, other types of schools) during analysis. Only the grammar schools are comparable across all federal states; all other types of school have different specific characteristics in each federal state. It remains unclear final data set for Germany stratified by federal state, number of schools and sex.

For each federal state, sample selection was stratified by the existing school types. Due to the heterogeneous structures that exist in the 16 federal states, the types of schools were split into four categories to allow for comparisons (Table 3).

### Table 3

<table>
<thead>
<tr>
<th>Type of school</th>
<th>5th school year</th>
<th>7th school year</th>
<th>9th school year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
</tr>
<tr>
<td>Grammar schools</td>
<td>337</td>
<td>300</td>
<td>335</td>
<td>290</td>
</tr>
<tr>
<td>Intermediate secondary schools</td>
<td>126</td>
<td>108</td>
<td>140</td>
<td>131</td>
</tr>
<tr>
<td>Mixed forms*</td>
<td>226</td>
<td>212</td>
<td>185</td>
<td>202</td>
</tr>
<tr>
<td>Lower secondary school</td>
<td>50</td>
<td>73</td>
<td>61</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td>739</td>
<td>693</td>
<td>721</td>
<td>696</td>
</tr>
</tbody>
</table>

* The mixed form is a heterogeneous group and includes comprehensive schools, schools that combine lower and intermediate secondary education, as well as primary schools in Berlin and Brandenburg.

3.4 Weighting

The realised sample was compared with the target sample regarding a representative distribution by federal state and type of school. Here, slightly lower participation rates in some federal states or by certain types of schools, as well as data cleansing, have led to small incongruences in the composition of the realised sample. Therefore, a weighting variable was applied. The variable corrects the realised proportions with regard to the target distribution by federal state, type of school, sex and age, and thereby improves the representativeness of the sample. All analyses were conducted with the weighting variable; absolute number of cases are presented unweighted.
whether the differences found by type of school are owed to the school form as such or to the differences between federal states [20].

In general, operationalising socioeconomic status during adolescence is challenging. Usually the socioeconomic status of adolescents is surveyed by using family indicators, such as parents’ levels of education, occupation or income. However, it is unsure whether these indicators – in particular with increasing age of adolescents – can properly indicate the socioeconomic position of adolescents themselves. Furthermore, children and adolescents find it difficult to report this information on their parents correctly, resulting in missing or incorrect values. Adequate forms of indicators for adolescents are increasingly being discussed [21–24]. The HBSC study has therefore developed the Family Affluence Scale (FAS), which reflects family affluence and is easy for students to complete [25–28]. Over the last 20 years, this instrument has been continuously adapted to the constantly changing living conditions of children and adolescents [28, 29]. In the 2013/14 and 2017/18 survey cycles, FAS was operationalised based on six items (car ownership, own (bed)room, holidays with family, having a computer, number of bathrooms, owning a dishwasher). Points are given for each item and added up. A relative measure was used for the analyses, which led the FAS to be divided into three categories indicating either low (lowest 20% of the sample), medium (middle 60% of the sample) and high (highest 20% of the sample) family affluence [6, 28].

HBSC also surveyed the migration background of students, whereby students were asked to state where they, their mother and their father had been born. Due to data protection regulations, an open question was not possible, which meant that adolescents were asked to choose from a short list of countries that included Germany or they could select ‘other country’. Similar to the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) [30], migration background was split into three categories based on the reported countries of birth of students and their parents. Adolescents with one parent born outside of Germany are categorised as having a one-sided migration background. A two-sided migration background was present if a) the adolescent itself was not born in Germany and at least one parent was not born in Germany or b) both parents had moved to Germany and were not born in Germany.

All other adolescents were considered as having no migration background. Table 4 shows the frequencies and percentage distribution of these sociodemographic and socioeconomic variables.

4. Discussion

The HBSC study provides internationally comparable, valid and representative data on child and adolescent health in Germany. Standardised surveying procedures across all participating countries and subsequent data cleaning make this data an important basis of information on the health of children and adolescents in up to 50 countries. In some countries, HBSC data is the only comprehensive source of data on child and adolescent health. The HBSC study covers numerous important determinants for the health and health behaviour of adolescents and, moreover, analyses possible influencing factors against the backdrop of family,
Limitations

In spite of the study’s importance and its international presence, participation rates have been dwindling in many countries, including Germany, both for schools and for students. A broad set of measures to attract participants has not reversed this long-term trend of decreasing participation rates, which has also been observed in other studies. Reasons for this decreasing interest of schools could be the increasing number of school surveys, a lack of staff, or that schools are not provided with incentives, for example in the form of specific school evaluations (with the exception of the representative federal state level samples from Brandenburg and Saxony-Anhalt). Due to data protection concerns such an approach is not possible in all federal

school and peer group. In collaboration with the WHO, which uses the HBSC data as an important fundament to assess child and adolescent health, the international results are presented following a survey cycle every four years [9, 31, 32].

In the past, the data was also used to conduct more in-depth analyses, such as reports on trends and differences in levels of alcohol consumption in the WHO Europe region [5], or on obesity [7]. HBSC also co-operates with the United Nations children’s fund (UNICEF). This work has led to a number of international analyses on child and adolescent health, such as on inequality of health opportunities [10–13], trends for life satisfaction and health [33] or on diet and physical activity [34] relative to family affluence.
The 2017/18 Health Behaviour in School-aged Children (HBSC) study

The results also serve as a basis to determine and monitor health targets, in particular against the backdrop of Germany’s Prevention Act (PrävG).

states, and would also require a considerably higher number of academic staff and funding.

Models could, for example, be HBSC countries that achieve higher participation rates due to seeking only ‘passive consent’. Passive consent means that participants are considered to have provided consent if they do not actively object to participating. The opposite would be ‘active consent’, i.e. participants need to actively provide consent to participate. The German HBSC study is based on active consent.

Studies have shown that under active consent, as opposed to passive consent, not only were participation rates lower, but that also far fewer male and older participants were reached [35, 36]. The results on reported health behaviour are heterogeneous using active consent. Whereas one study, for example, showed lower prevalence for risky, as well as for anti-social or deviant behaviour [35], a meta analysis on substance consumption showed higher prevalence [36]. Moreover, participation in studies such as the Programme for International Student Assessment (PISA) is compulsory for schools in Germany and, therefore, has very high participation rates [37]. In future, it is also possible that online surveys could generate higher rates of participation while requiring fewer resources. Other studies have already shown a greater preference for online formats when both formats (paper-and-pencil method vs. online) are offered [18].

The cross-sectional design of the HBSC study presents a further limitation. Such a design is well suited for trend analyses, but not to the deduction of causalities. Furthermore, HBSC uses a broad set of indicators to survey child and adolescent health, yet this has the disadvantage that only few items could be used for specific topics. A further limitation of the questionnaire on gender identity is that it does not use a third category such as ‘other’. This should be changed in future HBSC survey cycles.

Outlook

For Germany, the HBSC study, in combination with studies such as KiGGS, provides information on the health trends of young people nationwide as a fundamental contribution to federal health reporting (GBE) in childhood and adolescence [15]. HBSC results have, for example, been condensed into Fact Sheets for a number of health indicators and uploaded to the GBE website. Overall, the data helps to identify fields of action and risk factors in a targeted manner and provides a basis for decision makers in politics and health practice to initiate health promotion and prevention measures. ‘But data alone will not create change, especially if it does not get into the hands of decision makers who determine funding levels and government priorities’ [38]. HBSC hopes to build a bridge between science and politics and, in close co-operation with decision makers, strengthen the health of children and adolescents [38]. In future, it would therefore be desirable, in close co-operation with the ministries of health and culture, to more strongly establish the HBSC study in the school environment, create incentives to increase participation and develop corresponding structures to continuously implement the study.

Overall, the HBSC results provide important starting points to identify risk groups and fields of action for politics and initiate targeted and needs-oriented measures of prevention and health promotion as well as to corroborate
and evaluate the success of these measures through the surveys repeated every four years. HBSC results can provide a basis to determine and monitor health targets and constructively influence the debate on the health development of children and adolescents. Against the backdrop of Germany’s Prevention Act (PrävG), which was adopted in 2015, this is of particular importance.

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References
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