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## Depressive symptoms of children and adolescents in a German representative sample: results of the BELLA study

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### Introduction

Depressive symptoms and disorders are a substantial and increasing source of illness, disability, and suffering

■ **Abstract** *Background* In Europe, a considerable proportion of children and adolescents is affected by depressive symptoms, impairing their everyday life and social functioning. *Objectives* The aim of this paper is to provide an overview of the depressive symptoms in children and adolescents in Germany, addressing risk factors, comorbidity, and impact of depressive symptoms on everyday life. *Methods* In the BELLA study, the mental health module of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS), a representative sample of young people aged 7–17 years was enrolled. Depressiveness, assessed by the CES-DC, as well as other mental health problems were examined in the context of risk and protective factors. *Results* Depressive symptoms showed high prevalence in parent- and self-reports. Higher depression scores were found in those with a high number of psychosocial risks existing in the family, and they decreased as the number of protective factors the

children and adolescents had at their disposal increased. Although only half of the boys and girls with high depression scores were regarded as significantly impaired, all of them had a much higher risk for additional mental health problems. Furthermore, their health-related quality of life was limited compared to their peers who had low depression scores. *Conclusions* To differentiate between clinically significant depression and milder forms, it is necessary to take into account the different perspectives of children and their parents. Prevention and intervention should acknowledge the widespread distribution of depressive symptoms in children and adolescents, the high comorbidity of depressive and other mental health problems and the impact of depression on the aspects of everyday life.

■ **Key words** depressive symptoms – children and adolescents – comorbidity – health-related quality of life – survey

in childhood and adolescence [13, 28]. Diagnostic approaches describe two important disorders in this field: major depression and dysthymic disorder. These are recurrent unipolar mood disorders which in childhood are phenomenologically equivalent to adulthood,

besides some developmental differences [8]. With a few exceptions, the DSM-IV [4] diagnoses of major depression and dysthymia are comparable to the diagnostic categories of moderate to severe depression and dysthymia in the ICD-10 [38, 44]. According to the DSM-IV, the diagnosis of major depression requires a period of depressed mood or irritability for at least two weeks in addition to further characteristic symptoms. These may occur in cognition (e.g. poor concentration, feelings of worthlessness and guilt) and/or emotion (e.g. tearfulness, loss of temper, reduced sense of pleasure or interest). Vegetative symptoms, such as changes in appetite and weight, insomnia or hypersomnia or changes in motor behaviour (agitation or slowing down) may also occur. Dysthymia in children represents a milder mood disorder with chronically depressed mood or irritability for at least 12 months. Cognitive or vegetative symptoms also may be present, but with lesser severity of symptoms than observed in major depression.

While reviews of previous research report average frequencies of depressive disorders in children and adolescents of up to 5% [8, 15, 23], the percentage of moderate depression is estimated to range up to 15% [11]. Previous research shows that depressive disorders are relatively rare in children but become more prevalent in adolescents [18]. Furthermore, the sex ratio changes considerably with age, as while almost no gender difference can be found in children, depression occurs much more frequently in adolescent girls than boys [18, 28].

Identification of depressive symptoms and disorders in childhood and adolescence is important since depressive episodes are likely to recur and persist into adulthood [24, 32, 36]. They also have a considerable impact on social functioning and are associated with an increased risk of suicide [29, 43]. Depression has been observed in different cultures [3] over different timeframes by means of different measurements [25].

Even though some children and adolescents are severely affected by depressive symptoms, clinically relevant disorders are not the only disorders of interest. Harrington and Clark [21] argue that according to the diagnostic manuals, operational definitions for clinicians do not reflect the full epidemiological reality. To a certain degree, feeling down, having difficulties getting going or having low self-esteem, can mark normal developmental transitions. Since depressive symptoms are rather common in childhood and adolescence (only a minority of adolescents do not report any depressive symptom [21]), it is difficult to draw the line between normal and pathological signs of depression. Mild to moderate symptoms of depression are quite common in young people [11]. Even if they do not meet the

diagnostic criteria for major depression, young patients show impaired functioning nonetheless [28]. Since most of depression-related impairment in the adolescent population results from youth with mild depression, a quantitative approach that takes into account the frequencies of different symptoms provides important information [21].

Internalising problems such as depressive symptoms and disorders in children and adolescents often remain unidentified because they have less impact on patients' social environment (family members, peers, etc.) than hyperactivity or conduct problems [8]. As a consequence, depressed children and adolescents receive less help or treatment than necessary [30, 35]. To better detect depressive symptoms and disorders, it is important to obtain the children's and adolescents' own perspective on their problems and not only that of their parents.

This paper investigates the depressive symptoms of children and adolescents in a German representative sample. Research questions focus on which single depressive symptoms occur in childhood and adolescence, how they aggregate to symptom complexes and how frequently depressiveness of clinical relevance occurs. This approach accounts for the entire spectrum of depressive symptomatology, from sub-clinical symptoms up to psychiatrically relevant disorders. The associations of depressive symptoms with risk and protective factors are analysed, as this information is regarded as useful for mental health screening, prevention and intervention. Additionally, information is given regarding the relationship of parent- and self-report on depressive symptoms in order to assess convergent as well as divergent perspectives of parents and their children. The burden and impairment associated with depressiveness is explored in terms of everyday social functioning, comorbid mental health problems and health-related quality of life.

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## Methods

The BELLA study assesses the prevalence and persistence of mental health problems in a representative sample of children and adolescents aged 7–17 years in Germany. Depressive symptoms of children and adolescents were measured in the context of other mental health problems, risk and protective factors, and health-related quality of life [34]. The impact of risk and protective factors on mental health and health-related quality of life is also determined by means of follow-up data collections. In this paper, data and results from the first data assessment are evaluated and presented.

## ■ Recruitment and sampling

The BELLA study is the Mental Health Module of the German child and adolescent health interview and examination study KiGGS [26, 27]. The conceptualisation, design and procedure of the BELLA study are described in detail elsewhere [34].

The participants of the BELLA study were randomly recruited from a national representative sample of 17,641 families participating in the German Health Interview and Examination Survey for Children and Adolescents (KiGGS), conducted by the Robert Koch-Institute. The KiGGS and BELLA surveys took place between May 2003 and May 2006 in 167 representative cities and communities of Germany. The overall response rate was 66.6% (KiGGS). A random selection of 4,199 families from the KiGGS sample with children aged 7–17 were asked to participate in the BELLA study. Of these eligible families 70% agreed to participate and 68% (1,389 girls and 1,474 boys) could be surveyed. Of those, 1,142 had children aged 7–10 years, 780 had children aged 11–13 years and 941 had 14–17 years old adolescents. In each family, one parent provided responses to a standardised computer assisted telephone interview. Children aged 11 years and older were questioned as well. In addition, the participants were asked to fill in a mailed paper questionnaire. Sample-data were weighted to correct for deviation of the sample from the age-, gender-, regional- and citizenship-structure of the German population (reference data 31.12.2004).

## ■ Instruments

For the assessment of depressive symptoms, the Centre of epidemiological studies depression scale for children (CES-DC; [40], for details see [5]) was used in the BELLA telephone interview with parents and adolescents. The 20 symptom ratings of the CES-DC are summed up to a total score ranging from 0 to 60, with higher scores reflecting higher depression. A score above 15 indicates the need for further verification of depression according to the DSM diagnostic system (sensitivity = 71%, specificity = 57%) [19]. The 20 CES-DC items are assigned to the four subscales “somatic symptoms and retarded activity”, “depressed affect”, “positive affect”, and “interpersonal problems”.

Anxiety was assessed with the parent- and self-report version of the screen for child anxiety related disorders (SCARED, [9]) in the five-item short version. Two instruments were used to collect information about hyperactivity and attention problems: parent- and self-ratings of the Conners’ scale [14] as well as the parent-report on the questionnaire for

hyperactivity (FBB-HKS, [16]). Conduct problems were assessed via parent-reported externalising problems scales (delinquent and aggressive behaviour) of the child behavior checklist (CBCL, [1]). Two further items from the CBCL and its self-report version youth self report (YSR, [2]) were used to identify self-mutilation, suicide attempts and suicide ideation. The adolescents were asked about problematic eating behaviour using the SCOFF questionnaire [31]. The SDQ impact supplement [20] was used to assess the burden associated with the symptoms of mental health problems.

Study-specific questions regarding psychosocial risks for mental health according to Dührssen and Lieberz [17] and following Rutter’s concept of a family adversity index [37] were also part of the BELLA questionnaires. Risk factors assessed from parents’ report were low parental education, frequent and severe conflicts in family and partnership, mental disorders or chronic diseases of parents, parental alcohol problems, single parent family, long lasting unemployment, unwanted pregnancy, impaired harmony in the parent’s family of origin, and lack of social support during the child’s first year of life. Additionally, parental strain due to daily life and social role demands was assessed by a 12-item scale [10]. A cumulative risk index was aggregated, indicating how many of the risks were present [41].

Standardised scales for protective factors were partly integrated into the KiGGS questionnaire for adolescents, and additional scales were elements of the BELLA self-report questionnaires. Assessment of protective factors, as described in detail by Wille et al. [41] (see also [6]), focuses on personal resources (core items for personal resources, self-efficacy, self-concept, self-esteem, optimism), family resources (family cohesion, parental support), and social resources (social support, peer competence).

Health-related quality of life (HRQoL) was assessed by the self-report form of the KIDSCREEN-52 [33]. The KIDSCREEN-52 describes HRQoL in ten different domains (physical well-being, psychological well-being, moods and emotions, self-perception, autonomy, parents, peers, school, bullying, and financial situation). For each of the domains, scale scores are computed by summing up the domain specific item ratings. The scale scores are converted into T-values based on a European norm sample [33]. T-values are distributed around a mean of 50 with a standard deviation of 10.

## ■ Statistical analysis

All statistical analyses using SPSS 12 were based on the weighted sample-data to represent the age-, gen-

der-, regional- and citizenship-structure of the German population (reference data 31.12.2004). The number of cases reported in the tables and text refers to weighted data and thus might deviate from the number of cases reported in the former description of the sample. Data regarding depressive symptoms were analysed separately for the age groups 7–10 and 11–17 years for parent-ratings and for self-ratings of adolescents aged 11–17 years.

The prevalence of depressive symptoms are described as the percentages of agreement with each single symptom. The relations of depressive symptoms with age and sex are given by correlation coefficients ( $r$ ,  $\Phi$ ). The convergence of parent- and self-rating was explored using the intra-class correlation. Correlations between aggregated CES-DC depression scores and risk and protective factors, as well as HRQoL scores, were computed. The impact of depressive symptoms on children's and adolescents' daily life and social functioning was derived from high scores in the SDQ impact scale [20]. The proportion of depressive children and adolescents with comorbid mental health problems was computed using the established cut-offs of the different measurements. Odds ratios adjusted for age and sex were computed in order to describe the degree to which the risk of additional problems increases in children and adolescents with high depression scores compared to their peers with depression scores below the cut-off.  $t$  tests were conducted to test for limitations of the HRQoL in children and adolescents with high depression scores.

## Results

### ■ Sample

A total of 2,863 children and adolescents were enrolled in the BELLA study and were asked to complete the telephone interview and paper questionnaires for parents of children aged 7–17 years and for adolescents aged 11–17 years. Telephone interviews, which included CES-DC questions about depressive symptoms, were conducted with 2,789 parents and 1,845 adolescents. Cases in which parents (2.6%) or 58 adolescents (3.0%) failed to complete the telephone interview were therefore excluded from all analyses. The main reason parents gave for not completing the interview were problems with the German language, while the reasons for not interviewing adolescents included withdrawal of their consent or inability to contact them. The final sample in this paper consisted of 2,860 children and adolescents, for whom at least a parent-report or a self-report of depressive symptoms was obtained.

### ■ Prevalence of depressive symptoms and symptom complexes

Table 1 shows the prevalence of depressive symptoms in the CES-DC subscales according to the response categories “some” and “a lot”. Results are presented separately for the parent-report of 7–10 and 11–17 year olds and the self-report of the 11–17 year old children and adolescents, stratified by gender.

All items of the positive affect subscale showed high prevalence in the parent-report as well as in the self-report, indicating a lack of positive affect. Apart from the positive affect items, the most frequently endorsed single symptom in the parent-report was “couldn't pay attention”. Together with “didn't sleep as well as usual”, this was also the item most often mentioned by girls in the self-report, whereas boys more often described themselves as “more quiet than usual” and “too tired to do things”.

In the parent-report, there were no relevant differences between boys and girls regarding the frequency of depressive symptoms ( $|\Phi| < 0.10$  for all items). In the self-report, most symptoms were reported by a greater proportion of girls than of boys, but the differences—though partly reaching statistical significance—had a low effect size. For the items “felt like crying”, “felt sad”, and “felt like I was as good as other kids”, the contingency coefficient was  $\Phi > 0.10$ , indicating higher symptom scores for girls.

All items in the parent-report and most items in the self-report do not vary with age. Exceptions cover three items in the “somatic symptoms and retarded activity” domain (i.e. “felt too tired to do things”, “didn't sleep as well as usual”, and “it was hard to get started”) and one item from the “positive affect” domain (i.e. “had a good time”), which all were chosen more often as the age of the adolescents increased ( $0.10 \leq r \leq 0.14$ ).

In Table 2, the depressive symptoms are aggregated to symptom complexes according to the subscales of the CES-DC. The table shows the proportion of children and adolescents who answered at least one item of the symptom complex with “some” or “a lot” (for the symptom complex “positive affect”, proportions were based on the response categories “not at all” and “a little” in analogy to Table 1). Results are presented separately for the informants and age groups, stratified by sex.

With regard to the parent ratings, about one quarter of all children and adolescents showed depressive symptoms in the area of somatic complaints or lack of energy during the last week. In the age group 11–17 years, parents more frequently described their boys as showing a lack of positive affect ( $\Phi = -0.06$ ). Symptoms indicating depressed affect

**Table 1** Prevalence of depressive symptoms (response categories “some” & “a lot”, proportions in %)

Subscale/Item	Parent-report				Self-report	
	7–10 years		11–17 years		11–17 years	
	Boys	Girls	Boys	Girls	Boys	Girls
I. Somatic symptoms and retarded activity						
Was bothered by things	3.3	5.0	4.5	4.2	7.4	8.5
Did not feel like eating	4.5	7.5	3.5	3.1	4.8	8.2
Couldn't pay attention	13.3	9.2	11.5	8.5	9.7	11.9
Felt too tired to do things	4.9	4.1	5.5	6.2	10.7	11.6
Didn't sleep as well as usual	6.5	4.3	4.6	5.4	8.5	11.9
Was more quiet than usual	2.4	1.3	3.2	3.7	12.0	8.1
It was hard to get started	4.9	6.7	10.9	7.0	4.7	5.1
II. Depressed affect						
Wasn't able to feel happy	2.6	1.3	3.7	2.6	5.6	7.0
Felt down and unhappy	4.3	5.2	5.4	5.5	5.1	8.9
Felt like things didn't work out right	2.9	3.4	3.4	2.7	6.0	8.1
Felt scared	4.3	2.6	3.1	2.2	2.1	4.9
Felt lonely	3.5	3.7	2.0	2.5	2.6	3.5
Felt like crying	5.1	6.5	2.4	3.7	1.5	5.3
Felt sad	4.1	5.4	3.5	4.6	4.5	10.0
III. Positive affect						
Felt like he/she/I was as good as other kids*	18.6	21.1	23.7	25.5	30.5	41.2
Felt like something good was going to happen*	53.9	50.1	60.9	57.9	59.8	58.1
Was happy*	9.2	4.5	15.7	12.4	12.1	14.6
Had a good time*	8.4	6.0	13.2	12.0	8.9	13.0
IV. Interpersonal problems						
Kids were not friendly to him/her/me	4.5	5.0	2.3	3.2	5.1	2.8
Felt people didn't like him/her/me	2.6	2.8	1.6	1.6	2.1	2.5

\*Item reversed (i.e., proportions for response categories “not at all” and “a little” are reported)

are reported for 11–15% of the boys and girls. A lack of positive affect was reported for more than half of the respondents. Interpersonal problems, assessed by two items, were only reported by a small subgroup, mainly consisting of children aged 7–10 years.

All symptom complexes reached higher prevalence in the self-report than in the parent-report, with the greatest difference between the two on the “somatic symptoms and retarded activity” subscale. Symptoms of depressed affect were reported more often by girls than boys ( $\Phi = 0.08$ ). A significant correlation of depressive symptoms with age was observed only in the “somatic symptoms and retarded activity” complex ( $r = 0.11$ ), suggesting that more symptoms in this area were reported with an increasing age of the adolescents.

### ■ Correlates of depressiveness

The inter-individual agreement of parent- and self-report on depressive symptoms was limited, as suggested by an intra-class correlation coefficient of 0.34 for all participants (data not shown). The intra-class correlation of CES-DC sum scores did not differ between the younger and the older adolescents (11–13 years: 0.33, 14–17 years: 0.36) and between boys (0.31) and girls (0.38). Correlations of depressive symptom scores with risk and protective factors assessed in the BELLA study

**Table 2** Prevalence of depressive symptom complexes (proportions in %)

Symptom complex (CES-DC subscale)	No. of items	Parent-report				Self-report	
		7–10 years		11–17 years		11–17 years	
		Boys	Girls	Boys	Girls	Boys	Girls
I. Somatic symptoms and retarded activity	7	24.4	23.3	25.2	22.8	33.0	36.8
II. Depressed affect	7	14.5	14.0	11.0	12.5	15.4	21.7
III. Positive affect	4	60.4	59.0	70.5	65.1	70.7	70.9
IV. Interpersonal problems	2	6.0	5.6	3.3	3.7	6.2	4.5

[41] were therefore examined separately for the CES-DC parent- and self-reports.

The cumulative risk index was moderately correlated with the parental reported depressive symptoms ( $r = 0.23$ ). In addition, a small correlation with self-reported symptoms ( $r = 0.12$ ) was observed (data not shown). The depressiveness reported by parents was positively correlated with parental strain ( $r = 0.29$ ), meaning that parents reporting a high level of stress and burden due to social demands also rate their children's depressive symptoms to be more severe. Self-reported depressive symptoms showed a lower correlation with parental strain ( $r = 0.12$ ) (data not shown).

**Table 3** Correlation of depressive symptoms with protective factors

Protective factor	Correlation* with CES-DC	
	Parent-report 11–17 years	Self-report 11–17 years
Personal resources		
Core items personal resources	–0.16	–0.30
Self-efficacy	–0.16	–0.29
Self concept (CHIP)	–0.16	–0.38
Self-esteem (SPPC)	–0.26	–0.43
Optimism	–0.17	–0.36
Family resources		
Family cohesion	–0.17	–0.28
Parental support	–0.14	–0.31
Social resources		
Social support	–0.15	–0.23
Peer competence	–0.15	–0.33

\* $P < 0.01$  for all correlations

We found that depressive symptom scores were negatively correlated with all protective factor scales that were administered as self-report instruments in the study (Table 3). Moderate correlations were observed between personal, family and social resources scales and the CES-DC self-report. The magnitude of the correlations in the three resources areas was similar. The highest correlation was found for the self-esteem scale answered by the adolescents with their self-reported depressiveness. The correlations of the protective factor scales with the depression scores reported by the parents were lower than with the CES-DC self-report.

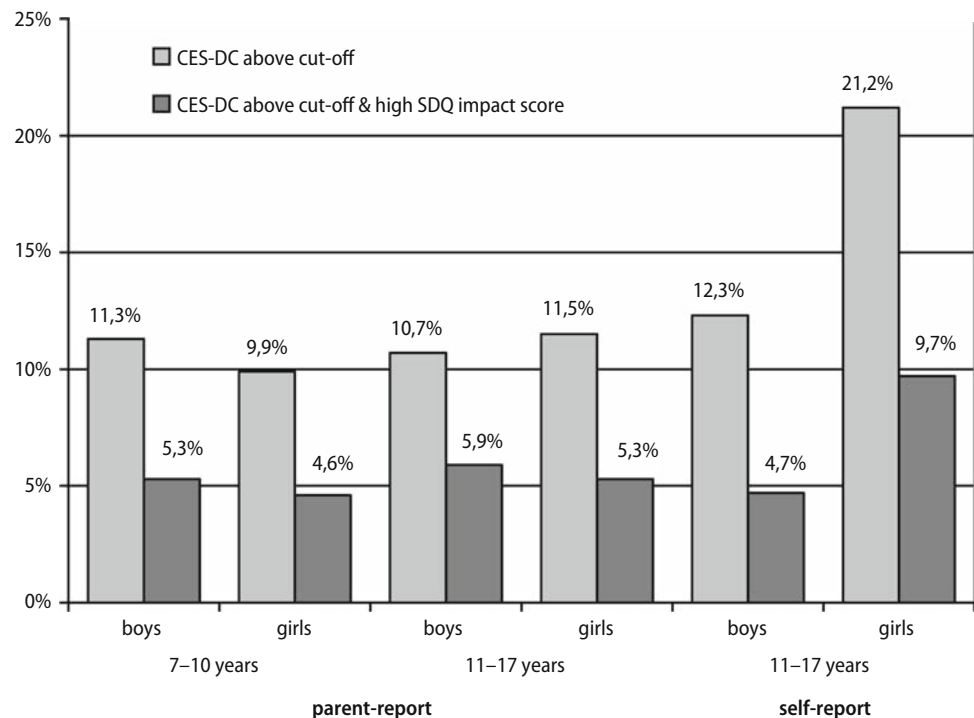
### ■ Burden and functional impairment associated with depressiveness

In the parent-report of the CES-DC, 10.9% of the scores were beyond the cut-off for the clinical relevance of 15. This proportion was nearly equal in children aged 7–10 years (10.6%) and adolescents aged 11–17 years (11.1%). As shown in the light-shaded bars in Fig. 1, the 7–10 year old boys are described by their parents as having depressive problems slightly more often than the girls of this age group, while in the 11–17 year old age group, the proportion was reversed. Altogether, gender differences were small and without clinical significance according to the parent-report. In the adolescents' self-report, however, girls reached high depression scores above the cut-off nearly twice as often as boys.

When a high SDQ impact scale score (indicating moderate to severe impairment in at least two domains) was used as an additional criterion, the prevalence of children (7–10 years) identified as depressive was reduced from 11% to 5% for boys and from 10% to 5% for girls. The reduction was similar in the 11–17 year age group (dark-shaded bars in Fig. 1).

Approximately one third of the boys with high self-reported depression scores on the CES-DC also had high SDQ impact scores. The proportion of girls with high CES-DC depression scores that had also described themselves as impaired in everyday functioning on the SDQ impact scale was higher than that of the boys.

**Fig. 1** Prevalence of depressive problems with and without reported impairment



■ **Comorbidity of children and adolescents with high depression scores**

Table 4 presents which proportion of study participants with high depression scores (CES-DC above cut-off) showed additional specific mental health problems. Anxiety problems showed a higher comorbidity for girls than boys in the parent-report as well as in the self-report, particularly in the younger age group. The odds ratio (OR) adjusted for age and sex for comorbid anxiety problems in children and adolescents with high depression scores was OR = 6.1 (95% CI: 4.6–8.1) for the parent-reported symptoms and OR = 5.6 (95% CI: 4.2–7.5) for the self-report.

Hyperactivity problems, as assessed by the Conners' scale in parent- and self-reports, were reported by more than one third of the parents that described their children as having depressive problems. Less than one fifth of the adolescents, however, stated these symptoms themselves. In addition, the odds ratio for the parent-report (OR = 8.4, 95% CI: 6.3–11.1) was considerably higher than for the self-report (OR = 3.3, 95% CI: 2.2–5.0). The numbers reported for ADHS comorbidity of children and adolescents with depressive problems, assessed only from the parents in the FBB-HKS, contradicted the high comorbidity rates. In addition to the depressive symptoms, 21% of the parents reported marked ADHS problems for the younger boys aged 7–10 years. In contrast, only 4–8% of the girls and older boys aged 11–17 years were reported as having both problems. The overall odds ratio adjusted for age and sex was OR = 3.6 (95% CI: 2.1–6.1).

Approximately one third of the parents reporting depressive problems of their children also described them as having externalising problems (see Table 4). For the younger boys, as many as half of the parents report both problems. An overall odds ratio of 3.7

(95% CI: 2.8–5.0) was computed for the comorbidity of depressive and externalising symptoms.

The rate of suicidal and self-mutilation comorbidity of children and adolescents with depressive problems varied substantially across the subgroups concerned. This rate ranged from 2% to 16% in the parent-report, which was relatively constant over the two age groups for girls. The rate, however, jumped from 2% for boys aged 7–10 years to 16% for 11–17 year old boys. In the self-report, a higher proportion of girls with depressive problems described themselves as also having suicidal and self-mutilation symptoms compared with the boys, whose rate of comorbidity was under their parents' in this area. Comorbidity odds ratios were higher in the self-report (OR = 7.0, 95% CI: 4.6–10.8) than in the parent-report (OR = 5.2, 95% CI: 3.2–8.4).

In addition, almost half of the girls with depressive problems reported problematic eating behaviours, which was almost twice as much as the comorbidity self-reported by the boys. The age and sex adjusted odds ratio was computed with OR = 2.6 (95% CI: 2.0–3.4).

■ **Quality of life of children and adolescents with high depression scores**

Figure 2 depicts the impact of depressive symptoms on the adolescents' health-related quality of life, measured by the KIDSCREEN-52 questionnaire. The quality of life scores of the adolescents without depressive problems ranged beyond T-values of 50 in all domains, suggesting that their quality of life was above the average of the European norm sample. In contrast, the quality of life scores of the 248 girls and boys reporting to have depressive problems were below the T-value of 50 in nine of the ten domains. Only in the financial subscale, their scale scores reach

**Table 4** Comorbid problem prevalences (proportion of children/adolescents with high depression scores above cut-off in other instruments in %)

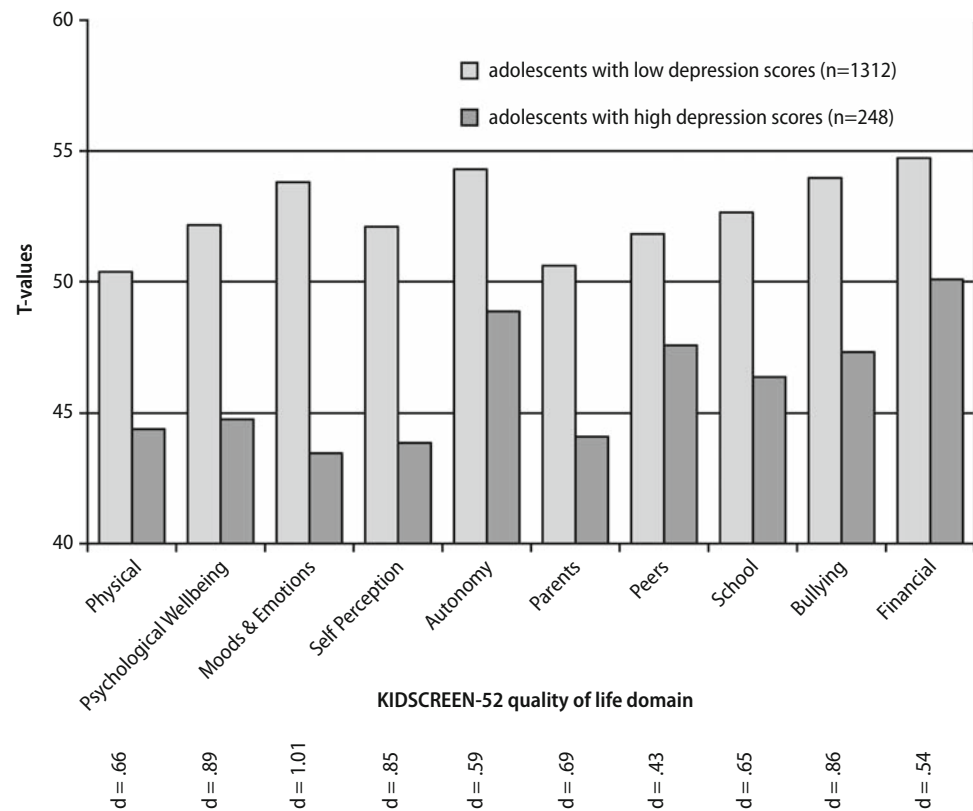
Problem (instrument)	Parent-report				Self-report	
	7–10 years		11–17 years		11–17 years	
	Boys	Girls	Boys	Girls	Boys	Girls
Anxiety (5-item SCARED)	23.6	47.8	33.7	37.3	33.9	44.6
Hyperactivity (Conners' scale)	34.5	39.1	36.4	38.8	11.5	16.6
ADHS (FBB-HKS) <sup>a</sup>	20.8	4.8	7.8	3.5	–	–
Externalizing problems (CBCL) <sup>a</sup>	51.0	33.3	28.6	30.9	–	–
Suicidality (CBCL/YSR) <sup>b</sup>	1.8	6.5	15.8	6.9	13.8	20.2
Problematic eating behaviour (SCOFF) <sup>c</sup>	–	–	–	–	26.5	47.9

<sup>a</sup>Only parent-report

<sup>b</sup>At least one of two items (self mutilation/suicidal behaviour or suicide ideation) is answered "sometimes" or "often/always"

<sup>c</sup>Only self-report

**Fig. 2** Health-related quality of life of adolescents with high vs. low depression scores



a T-value of 50.1, which still is significantly lower than that of their peers without depressive problems. In all quality of life subscales, the difference between participants with and without depressive problems was highly significant. Figure 2 also shows the effect sizes, which were highest in the “moods and emotions” domain followed by “psychological well-being”, “bullying”, and “self-perception”. Apart from these domains that had high effect sizes and which appeared to be the closest related to depressive problems, the effect sizes were of medium size in all other quality of life domains, with the exception of the “peers” domain in which a small effect is found.

A similar analysis conducted separately for boys and girls confirmed the data shown in Fig. 2. Overall, boys tended to report a higher quality of life in all domains, but when affected by depressive problems, they showed similar impairments in the various quality of life domains as the girls. Remarkable sex differences emerged in the “parents”, “autonomy” and “financial” subscales, where girls with depressive problems showed clearly stronger impact than boys. Conversely, boys with depressive problems were more impaired than girls in the “bullying” subscale (data not shown).

Correlations of depression scores with the subscale scores for HRQoL were highest for the “moods & emotions” ( $r = -0.50$ ), “psychological well-being” ( $r = -0.45$ ), and “self-perception” ( $r = 0.41$ ) domains,

and were between  $r = -0.26$  and  $r = -0.36$  for the other seven subscales.

## Discussion

The results presented here provide insight to children’s and adolescents’ mental health with special regard to depressive symptoms. Depressiveness in children and adolescents is examined from their own point of view as well as their parents’. Unfortunately, a gold standard for the assessment of depressive disorders in population-based studies such as the BELLA study is not yet developed [35]. The CES-DC cut-off score [19] was used to identify a group of boys and girls with clinically relevant depressive symptoms. Although exceeding this score does not imply a clinical diagnosis of depression, this group of children and adolescents have a noticeable amount of depressive symptoms that in the least requires further diagnostics.

Compared to the other CES-DC subscales, the “positive affect” items show higher prevalence (see Table 1). This might be explained by the fact that these four items are worded in a reverse fashion compared with the other 16 items. Besides the positively worded items, the single symptom most often named by parents is “couldn’t pay attention”, which

is more a sign of attention deficit problems than depression. The comparatively high prevalence rates in single symptoms are reflected in the prevalence of depressive symptom complexes (Table 2), raising the question of how seriously the symptoms have to be taken.

More than every tenth participant of the study showed parent-reported scores of depressiveness above the clinical cut-off with minimal age and sex differences (Fig. 1). According to the self-report, the prevalence of clinically relevant depressiveness is somewhat higher than the parent-report for boys but almost twice as high for girls.

When associated impairment is used as an additional criterion for the identification of children and adolescents with depressive problems (Fig. 1, see also [42]), the prevalence is reduced to about half of those identified by the CES-DC. Still, twice as many girls reported being significantly impaired in everyday functioning by their symptoms. This supports the need for a clinical procedure for reliably identifying depression. Questionnaire methods, especially those exclusively applying symptom ratings, will always be limited and lead to overestimation [20].

Parents judgement and the child/adolescent self-report showed only limited agreement. This applies not only to the amount of depressive symptoms reported by parents and adolescents, but also to the inter-individual agreement on the depressive symptoms of each participant. This corresponds to interrater concordance for the other mental health instruments in this study (data not presented) as well as to reports from other studies regarding mental health problems or subjective health reports [7, 39]. Still, it is remarkable that the girls' self-report and their parents' report had the tendency to correlate better than for boys, although boys and their parents were more consistent with regard to the level of depressive symptoms. A possible explanation could be that the adolescent girls communicate with their parents more than boys regarding emotional topics, but their appraisal of the severity of symptoms differs.

The finding that the adolescents report more depressive symptoms than their parents agrees with other studies [8]. Unfortunately, there is no way to decide whether this disagreement can be explained by parents' lack of awareness of their children's (especially girls') problems, or whether the adolescents are more sensitive to the perception and description of their symptoms, even if they are not severe enough to be of clinical relevance.

In this regard, it is noticeable that parent-reports lack meaningful sex differences. It is possible that parents compare their child with peers of the same sex and age when answering the questions, thus reducing the differences that could otherwise be ex-

pected. For the clinical setting, it should be concluded that it is extremely important to include both the parents' and the child's perspective, especially when a diagnosis in an emotional area is concerned.

A relatively high comorbidity of depressive and anxiety symptoms (Table 4) agrees with other studies [15]. The high comorbidity of hyperactivity and externalising problems with depressive problems in the parent-report was also reported by Lehmkuhl et al. [28]. One possible explanation is that some parents regard their children as generally "problematic", producing high problem scores in all questionnaires applied. In regard to the comorbidity of suicidal with depressive problems, it must be taken into account that the case numbers are relatively small. A clear association between suicidal and depressive symptoms can be seen in the self- and parent-reports for adolescents and younger girls, but not boys. The much higher proportion of girls reporting problematic eating behaviour (see also [22]) as can be seen here for adolescents with high depression scores are consistent with the results from earlier studies [8].

Clinical diagnostics have to take into account high comorbidity and must therefore explore both the symptoms presented first as well as other potential mental health problems, such as externalising symptoms. Suicidal symptoms and problematic eating behaviour also play an important role in adolescents with depressive problems and should be addressed in any treatment of depressed boys and girls [43].

In children and adolescents with high depression scores, the impairment that can be seen in virtually every aspect of health-related quality of life shows that the impact of depressive problems is a very general one. The emotional symptoms and the impaired self-concept typical of depressive problems have negative consequences on the children's and adolescents' family life, their social contacts and their coping with school demands.

Depression was accompanied by other mental health symptoms (see Table 4), by a lack of protective factors (see Table 3) and by impairments in all quality of life domains (see Fig. 2). This demonstrates that prevention and intervention should address these areas in addition to the core depressive symptoms. Harrington and Clark [21] point out that most of the morbidity and burden associated with depressive symptoms arises from children and adolescents who have no psychiatric diagnosis of depression, but only mild depressive problems. Prevention should therefore also aim at these milder forms of depression.

Depressive symptoms and depressive problems are a frequent phenomenon in childhood and adolescence. Children and adolescents with mental health problems need to be identified, diagnosed with

clinical expertise and be counselled or treated in an appropriate manner. Depressive symptoms are not as overt as hyperactivity or conduct problems, and therefore have a higher risk of not being detected. Since children and adolescents cannot be expected to articulate and classify their problems competently, they depend on adults to take responsibility in detecting depressive problems and seeking professional help. The assumption that parents can accomplish this task on their own is poor, and therefore pedagogic and medical personnel, relatives and other contact persons should also raise question if a boy or girl displays noticeable depressive symptoms. An approach considering these aspects has been taken by the German Alliance Against Depression [12].

The CES-DC has proven to be a suitable screening instrument for the identification of children and adolescents with depressive problems, using both parent- and the self-reports [5]. Its results, however, may not be taken as clinical diagnoses, but point to the need for further investigation. This can partly be provided by additional screening instruments such as

the SDQ impact supplement, but mostly requires clinical evaluation. The findings that higher CES-DC scores (even when they are not in a clinically pathological range) are accompanied by a lower amount of personal, family and social protective factors as well as by a markedly lower quality of life emphasises the importance of health promotion and resource orientation. The assets children and adolescents have at their disposal should be strengthened throughout their early childhood and school years.

Some of the questions remaining open will be addressed by the longitudinal data collection of the BELLA study. The development of depressive symptoms in terms of incidence, persistence and remission will be investigated. Furthermore, the contribution of risk and protective factors to mental health problems of children and adolescents as well as to changes in symptoms over time can be explored. Additional findings for prevention and intervention can be expected from the analyses of follow-up data.

■ **Conflict of interest** All authors declare no conflict of interest.

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