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## Self-mutilation and suicidal behaviour in children and adolescents: prevalence and psychosocial correlates: results of the BELLA study

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■ **Abstract** *Objective* To investigate the prevalence and psychosocial correlates of suicidal behaviour in a representative sample of children and adolescents in Germany. *Methods* Suicidal behaviour was assessed in the BELLA study in a sample of 2,863 families with children aged 7–17 using the corresponding questions from the child behavior check list and the youth self report. Self-reported as well as parent-reported measures of overall mental health problems, anxiety, depression, aggressive and delinquent behaviour, attention deficit/hyperactivity as well as health-related quality of life were also administered. *Results* Self-mutilation and/or suicidal attempts within the last six months were reported by 2.9% of the adolescents 11–17 years of age. Suicidal thoughts were reported by 3.8% of the same group of adolescents. The prevalence rates reported by the parents were 1.4% for self-mutilation and/or suicidal attempts and 2.2% for suicidal thoughts. The prevalence of parent-reported self-mutilation/suicidal attempts in children below

11 years of age was very low. Youth reporting suicidal behaviour were older than youth not reporting suicidal behaviour. Children and adolescents exhibiting suicidal behaviour reported significantly more general mental health problems, depressive symptoms, anxiety, and hyperactivity as well as lower health-related quality of life. *Conclusions* There is a strong connection between suicidal behaviour and emotional and behavioural problems, especially with symptoms of depression, anxiety and hyperactivity. The association observed between attention deficit/hyperactivity and suicidal behaviour requires further investigation. The differences in the extent of reported suicidal behaviour in adolescents between the self- and parent-ratings and the degree of confidentiality in the collection of the data are subjects for future research.

■ **Key words** suicide ideation – suicide attempts – self-mutilation – children and adolescents – prevalence

## Introduction

Suicide can occur in all age groups during childhood and adolescence. Prior to the onset of puberty, the prevalence of suicidal behaviour is low [26]. In adolescence, however, suicide is one of the leading causes of death [14]. In fact, in the United States it is the third leading cause after accidents and homicides, and an increase by more than 300% in the suicide rate for adolescents aged 15–19 years has been reported [2]. In Canada and Europe, suicide is the second leading cause of death, after accidents, in both genders [26]. As an important public health problem, suicide risk remains a subject of continuing mental health research. According to the findings of a WHO multi-centre study conducted in young people 15–24 years of age, an increase in suicide prevalence is associated with an increase in suicide attempts [15]. Results of a systematic review of 128 studies [9] revealed that on average, 9.7% (95% CI: 8.5–10.9) of adolescents reported to have attempted suicide (at some point in their life). Furthermore, an additional 29.9% (95% CI 26.1–33.8) of adolescents reported having suicidal thoughts at some point in their lives.

Non-suicidal self-harming behaviour has also been increasing in adolescent populations. These forms of deliberate self-harm should be differentiated from suicidal attempts because there is no direct intent to die. Adolescents often mention the need to stop unbearable feelings as the reason for such behaviours [26]. Recent population-based studies on non-suicidal self-harming behaviour revealed high prevalence rates ranging from 6–15% in representative samples of adolescents [5, 16]. There is considerable evidence that childhood and family adversities—including sexual and physical abuse, domestic violence, substance abuse among family members or criminal activities of family members—are strongly interrelated with suicidal behaviour in adolescents [13]. In addition, disrupted family structures (e.g. parental separation or divorce) and insufficient parenting resulting in low social and emotional support are discussed as risk factors for suicidal behaviours in young people [11]. Individual risk behaviours have also been associated with suicide attempts in adolescents. For example data from the National Youth Risk Behavior Survey show that impulsivity, behaviours associated with violence, alcohol, tobacco and drug use, risky sexual behaviours, as well as other risky behaviours were associated with a higher rate of suicide attempts [2]. Although little evidence exists for the role of adolescent attention deficit/hyperactivity disorder (ADHD) in the development of suicidal behaviour, anxiety, depression, and hopelessness seem to function as mediators of adolescent suicidal

behaviour [28]. The major goals of this study were to examine the prevalence of suicidal behaviour in children and adolescents, as well as their psychopathological and psychosocial concomitants.

## Methods

### ■ Study sample

The BELLA study is an extension of the German Health Interview and Examination Survey in children and adolescents (KiGGS) [17, 22]. For the KiGGS survey, a random sample of 167 communities (primary sampling units) in Germany was drawn from strata defined by federal state and population size. From these communities, a random sample of 28,299 families with children from 0–17 years was selected. Of those families, 26,787 could be contacted and invited to participate in the study. Of those, 17,641 agreed to participate. For the BELLA study, a random sample of 4,199 families with children aged 7–17 years was drawn from the 17,641 families participating in the KiGGS study. Of those, 2,863 (68.2%) agreed to participate. For each family, a telephone interview was conducted with one parent and a questionnaire was sent via mail. Adolescents aged 11 years or older were also interviewed via telephone and asked to fill out a questionnaire. For more details on the design and methods of the BELLA study, see [23] in this issue.

### ■ Instruments

*Self-mutilation and suicidal behaviour* were assessed with the corresponding questions from the child behavior check list (CBCL) and the youth self report (YSR), respectively (items 18 and 91). The questions regarding self-mutilation/suicide attempts were “I deliberately try to hurt or kill myself” for the children/adolescents and “Deliberately harms self or attempts suicide” for the parents. The questions asking for suicidal thoughts are “I think about killing myself” for the children/adolescents and “Talks about killing self” for the parents. Answer options were “not true”, “somewhat or sometimes true”, and “very true or often true”, scored as 0, 1, or 2. In the BELLA study, these two items were asked during the telephone interview.

*Overall mental health problems* were assessed with the Strengths and difficulties questionnaire (SDQ) [12]. The questionnaire consists of five subscales, each containing five items (emotional symptoms, conduct problems, hyperactivity, peer problems, and the prosocial scale). The total difficulties score is

generated by summing the scores from all scales except the prosocial scale. The impact supplement includes items on overall distress and social impairment. The sum of these items is then used to classify the subject as “normal”, “borderline”, or “abnormal” according to the UK norms [24]. The SDQ was administered to both the parents and children/adolescents. The SDQ impact supplement was also administered (Goodman 1999) with impact scores of 0, 1 and higher than 1 interpreted as normal, borderline and abnormal.

### Specific mental health problems

*Anxiety* was assessed with the screen for child anxiety related emotional disorders (SCARED) questionnaire [3], *depression* with the Center for Epidemiological Studies Depression Scale for Children (CES-DC) [10], *conduct disorder* with the two subscales “Aggressive Behaviour” and “Delinquency” from the CBCL [1], and attention deficit-/hyperactivity with the Conners’ scale [7]. The subscale “hyperkinetic disorders” from the “Diagnostic System for Mental Disorders in Childhood and Adolescence”, developed according to the ICD-10 and DSM-IV (FBB-HKS) [8] was also administered. The two CBCL subscales and the FBB-HKS were used only in the parent-questionnaires. The other scales were administered to both the parents and the children/adolescents.

*Health-related quality of life (HRQoL)* was assessed using the KIDSCREEN instrument [21] that was specifically developed for use in children and adolescents. In this analysis, only the total health-related quality of life index was used.

The *risk factors* included in the analysis were: low parental education, family conflicts, parental mental disorder as reported by the parent, family conflicts during one parent’s childhood and adolescence, conflicts in the partnership, early parenthood (mother or father younger than 18 years at time of birth), single-parent family, child resulting from an unwanted pregnancy, low social support perceived by the parent during the child’s first year of life, chronic problems (including chronic disease in one parent and unemployment during the child’s lifetime), and problematic alcohol consumption [30]. In addition to examining these individual risk factors, the total number of present psychosocial risk factors in each child was summed in order to make comparisons between different subgroups.

### ■ Statistical analysis

To correct for the difference between the sample and the population in terms of age, gender, region (east/

west/Berlin) and migration status, each subject was assigned a weight equal to the inverse of the probability of being sampled. The effect of the stratified cluster sampling design on the variance estimation (i.e. confidence intervals and significance tests) was also corrected by the use of linearised/robust variance estimators [18]. Means were compared with adjusted Wald tests and proportions were compared with a Pearson Chi-square statistic that was corrected for the survey design and converted into an *F* statistic [20]. Effect sizes were measured using Cohen’s *d* [6], defined as the difference of the means divided by the standard deviation. All calculations were performed using Stata 10 [25].

### Results

A total of 1,681 children and adolescents participated in the telephone interview and filled out the questionnaires. The information on self-mutilation/suicidal behaviours and suicidal ideas was missing for one participant. A total of 2.9% of subjects (95% CI: 2.1–3.9) reported self-mutilation or suicide attempts (other than “not true”), with 0.8% of subjects even stating this to be “very true or often true” (95% CI: 0.4–1.7). The reported prevalence of suicidal ideas was 3.8% (95% CI: 2.9–5.1), with 0.3% of the participants stating this to be “very true or often true” (95% CI: 0.1–0.9). A strong association was found between reported suicidal ideas and self-mutilation/suicide attempts (OR = 45.3, *P* < 0.0001).

A total of 1,621 parents of children and adolescents aged 11 years or older completed the telephone interview and the questionnaires. The rating of self-mutilation/suicide attempts of their child was missing for two of these, and the rating of suicidal ideas was missing for one. The parents reported self-mutilation/suicide attempts in 1.4% (95% CI: 0.8–2.3) of the cases. This is less than half of the prevalence found in the self-report, but since the confidence intervals overlap, this difference does not prove significant. The prevalence of suicidal thoughts reported by the parents was 2.2% (95% CI: 1.4–3.3). The self-reported prevalence was also higher here, though the confidence intervals overlapped here as well. A clear association between the parent-ratings and the self-ratings for both self-mutilation/suicide attempts (OR = 39.1, *P* < 0.0001) and suicidal thoughts (OR = 13, *P* < 0.0001) was found.

Since children below the age of 11 years were not interviewed, there are only parent-reports available for them. The prevalence of self-mutilation/suicide attempts was 0.4% (95% CI: 0.1–1.0) and the prevalence of suicidal thoughts was 1.8% (95% CI: 1.0–3.3).

Due to the small number of subjects in the response category “very true or often true”, both affirming categories (“somewhat or sometimes true” and “very true or often true”) were combined into one category for all further calculations.

Girls did not differ significantly from boys regarding their self-reported prevalence of self-mutilation/suicide attempts (OR = 1.9,  $P = 0.072$ ), but more girls reported suicidal thoughts (OR = 2.1,  $P = 0.017$ ). There was a small difference in the prevalence of self-mutilation/suicide attempts for the social stratum (lower = 4.1%, middle = 3.0%, upper = 1.0%,  $P = 0.031$ ). The prevalence of suicidal ideas did not vary between social strata ( $P = 0.209$ ). Adolescents with self-mutilation/suicide attempts were older than those without such behaviours (mean age 15.4 vs. 14.6 years,  $d = 0.52$ ,  $P = 0.004$ ), and adolescents with suicidal thoughts were older than adolescents without such thoughts (mean age 15.3 vs. 14.6 years,  $d = 0.43$ ,  $P = 0.007$ ).

Results of self-reported overall mental health problems (SDQ) showed that in all areas, with the exception of the prosocial scale, adolescents with self-reported self-mutilation/suicide attempts or suicidal ideas had significantly higher scores with medium to large effect sizes (see Table 1). The percentage of those with overall distress and social impairment (SDQ impact) in the abnormal range was 34.6% (95% CI: 19.5–53.6) with self-mutilation/suicide attempts versus 7.6% (95% CI: 6.2–9.3) without such behaviour (OR = 6.4,  $P < 0.0001$ ), and 45.6% (95% CI: 30.4–61.6) with suicidal ideas versus 7.2% (95% CI: 5.7–8.9) without such thoughts (OR = 10.9,  $P < 0.0001$ ). These differences were even more pronounced between the groups when concerning specific mental health problems. The scores for depression (CES-DC), hyperactivity (Conners’), and anxiety (SCARED) were

more than one standard deviation higher for the adolescents with self-mutilation/suicide attempts or with suicidal thoughts. As expected, the higher number of mental health problems in almost all domains showed a clear decrease in health-related quality of life (KIDSCREEN).

The results of the parental rating showed a similar picture, but it was less pronounced (see Table 2). The effect sizes were smaller and did not reach significance in SDQ peer problems for the effect of child-reported self-mutilation/suicide attempts, and for SDQ hyperactivity, prosocial scale, and CBCL aggressive behaviours for the effect of suicidal thoughts. On almost all scales, the parents rated their children better (i.e. lower in the problem scales and higher in scales such as the prosocial scale and health-related quality of life) than the children scored themselves. The only exception was the Conners’ Scale, where parents scored their children significantly higher (i.e. more ADHD problems).

The association between self-reported self-mutilation/suicide attempts/suicide thoughts and psychosocial risk factors is less clear. Only the occurrence of family conflicts in the interviewed child’s family as well as during their parent’s childhood and adolescence was significantly higher in adolescents with self-mutilation/suicide attempts or suicidal thoughts (see Table 3). The mean number of psychosocial risk factors present was significantly higher for adolescents with self-mutilation/suicide attempts ( $P = 0.021$ ), but not for adolescents with suicidal thoughts ( $P = 0.057$ ).

To estimate the influence of administering the questions in a telephone interview on the rate of reported suicidal ideation and behaviour, the prevalence from the BELLA study was compared with the prevalence from the Heidelberg School Study [5],

**Table 1** Means and 95% CI of self-rating scales in youth with and without self-reported self-mutilation/suicide attempts and suicidal thoughts

Self-reported measures of psychopathology and HRQoL	Self-reported Self-mutilation/suicide attempts				Self-reported Suicidal thoughts			
	No	Yes	<i>d</i>	<i>P</i>	No	Yes	<i>d</i>	<i>P</i>
	SDQ							
Emotional Symptoms	2.30 [2.20, 2.40]	4.09 [3.33, 4.84]	0.83	<0.001	2.25 [2.15, 2.35]	4.88 [4.21, 5.55]	1.24	<0.001
Conduct Problems	1.87 [1.80, 1.94]	3.01 [2.43, 3.60]	0.75	<0.001	1.87 [1.80, 1.94]	2.86 [2.43, 3.30]	0.65	<0.001
Hyperactivity	3.51 [3.37, 3.64]	4.67 [4.00, 5.35]	0.41	0.001	3.50 [3.37, 3.64]	4.47 [3.85, 5.08]	0.34	0.002
Peer Problems	1.88 [1.80, 1.97]	2.43 [1.95, 2.904863]	0.31	0.030	1.86 [1.78, 1.94]	2.95 [2.40, 3.49]	0.61	<0.001
Prosocial Scale	7.83 [7.73, 7.93]	7.45 [6.76, 8.13]	0.18	0.272	7.83 [7.73, 7.94]	7.45 [6.95, 7.96]	0.18	0.155
Total Difficulties Score	9.56 [9.32, 9.80]	14.20 [12.86, 15.53]	0.91	<0.001	9.48 [9.24, 9.71]	15.16 [13.85, 16.47]	1.13	<0.001
CES-DC	9.51 [9.12, 9.89]	19.30 [15.84, 22.77]	1.16	<0.001	9.35 [8.96, 9.74]	20.76 [17.85, 23.66]	1.33	<0.001
Conners’ Scale	5.41 [5.18, 5.64]	11.70 [10.01, 13.39]	1.28	<0.001	5.38 [5.14, 5.61]	10.97 [9.57, 12.37]	1.12	<0.001
SCARED	14.66 [14.19, 15.12]	24.58 [21.94, 27.23]	1.00	<0.001	14.48 [14.00, 14.96]	26.49 [23.90, 29.07]	1.18	<0.001
KIDSCREEN	94.30 [93.77, 94.82]	84.43 [81.49, 87.37]	0.89	<0.001	94.48 [93.94, 95.02]	82.44 [79.32, 85.55]	1.05	<0.001

\*Effect size index *d* and *P* values for the mean comparison with the adjusted Wald test

**Table 2** Means and 95% CI of parent-reported scales in youth with and without self-reported self-mutilation/suicide attempts and suicidal thoughts

Parent-reported measures of psychopathology and HRQoL	Self-reported				Self-reported			
	Self-mutilation/suicide attempts		<i>d</i>	<i>P</i>	Suicidal thoughts		<i>d</i>	<i>P</i>
	No	Yes			No	Yes		
SDQ								
Emotional Symptoms	1.66 [1.56, 1.76]	3.13 [2.27, 3.99]	0.67	0.001	1.65 [1.55, 1.76]	3.08 [2.44, 3.73]	0.64	<0.001
Conduct Problems	1.78 [1.69, 1.86]	2.83 [2.14, 3.52]	0.58	0.003	1.78 [1.69, 1.86]	2.61 [2.11, 3.12]	0.46	0.001
Hyperactivity	2.69 [2.56, 2.82]	4.00 [3.25, 4.76]	0.47	0.001	2.71 [2.58, 2.84]	3.30 [2.69, 3.91]	0.22	0.055
Peer Problems	1.42 [1.32, 1.52]	1.59 [1.10, 2.08]	0.08	0.504	1.40 [1.30, 1.50]	1.96 [1.47, 2.45]	0.27	0.030
Prosocial Scale	7.88 [7.79, 7.98]	7.16 [6.51, 7.80]	0.36	0.027	7.88 [7.78, 7.97]	7.50 [7.04, 7.96]	0.18	0.109
Total Difficulties Score	7.54 [7.26, 7.81]	11.55 [9.34, 13.77]	0.68	<0.001	7.52 [7.24, 7.80]	10.96 [9.39, 12.52]	0.58	<0.001
CES-DC	8.35 [8.03, 8.68]	14.10 [10.56, 17.64]	0.81	0.002	8.38 [8.03, 8.73]	11.95 [9.50, 14.41]	0.48	0.005
Conners' Scale	6.18 [5.86, 6.50]	10.12 [7.74, 12.49]	0.58	0.001	6.18 [5.86, 6.50]	9.32 [7.62, 11.02]	0.47	<0.001
FBB-HKS	0.46 [0.44, 0.48]	0.67 [0.51, 0.83]	0.46	0.011	0.46 [0.43, 0.48]	0.69 [0.51, 0.87]	0.49	0.013
SCARED	11.75 [11.23, 12.28]	18.67 [15.57, 21.76]	0.62	<0.001	11.71 [11.17, 12.25]	18.21 [15.67, 20.76]	0.58	<0.001
CBCL Aggressive Behaviour	6.05 [5.72, 6.39]	9.55 [7.31, 11.79]	0.53	0.003	6.08 [5.75, 6.42]	8.19 [6.05, 10.33]	0.32	0.057
CBCL Delinquency	1.83 [1.69, 1.98]	3.47 [2.30, 4.65]	0.57	0.007	1.84 [1.69, 1.98]	3.22 [2.05, 4.39]	0.48	0.022
KIDSCREEN	95.98 [95.44, 96.52]	90.37 [86.27, 94.48]	0.48	0.007	96.07 [95.51, 96.64]	89.46 [86.82, 92.09]	0.55	<0.001

\*Effect size index *d* and *P* values for the mean comparison with the adjusted Wald test

**Table 3** Percentages and 95% CI of psychosocial risk factors in youth with and without self-reported self-mutilation/suicide attempts and suicidal thoughts

Risk factor	Self-mutilation/suicide attempts			Suicidal thoughts		
	No	Yes	<i>P</i> *	No	Yes	<i>P</i> *
Low parental education	10.3% [8.6, 12.2]	16.9% [7.3, 34.5]	0.227	10.5% [8.8, 12.4]	10.5% [4.3, 23.2]	0.992
Conflicts in family	5.4% [4.2, 6.9]	16.9% [7.9, 32.6]	0.004	5.4% [4.2, 6.8]	15.3% [7.2, 29.6]	0.007
Mental disorder parent	13.6% [11.7, 15.7]	21.03% [10.7, 37.1]	0.197	13.6% [11.7, 15.7]	18.8% [10.4, 31.6]	0.277
Conflicts in family of parent	12.2% [10.4, 14.2]	24.5% [12.7, 41.8]	0.028	12.0% [10.2, 14.1]	24.8% [14.8, 38.6]	0.006
Conflicts in partnership	8.5% [7.1, 10.2]	9.6% [4.0, 21.5]	0.788	8.6% [7.1, 10.3]	7.0% [2.8, 16.2]	0.647
Early parenthood	1.7% [1.2, 2.5]	1.6% [0.2, 10.2]	0.937	1.7% [1.1, 2.6]	1.1% [0.2, 8.1]	0.691
Single parent	14.1% [12.1, 16.3]	20.0% [9.6, 37.0]	0.342	14.1% [12.2, 16.3]	16.4% [8.4, 29.7]	0.648
Unwanted pregnancy	4.0% [3.0, 5.3]	3.7% [0.7, 17.5]	0.944	3.9% [2.9, 5.2]	6.5% [2.3, 17.2]	0.351
Low social support	4.0% [3.0, 5.3]	8.0% [2.5, 23.1]	0.225	4.1% [3.1, 5.3]	5.2% [1.5, 16.4]	0.6914
Chronic disease or unemployment	39.6% [36.8, 42.4]	50.9% [33.7, 68.0]	0.200	39.5% [36.7, 42.4]	50.5% [37.3, 63.6]	0.110
Problematic alcohol consumption	20.0% [17.6, 22.6]	19.4% [8.6, 38.0]	0.936	20.0% [17.6, 22.7]	18.1% [9.5, 31.7]	0.747

\**P* values for the comparison of the proportions were calculated with the design-based *F* test

which involved a strictly anonymous paper-pencil assessment using the same questions. In the Heidelberg School Study, all ninth graders from Heidelberg and the Rhein-Neckar district were invited to take part. Of the available schools, 116 of the 121 schools agreed to participate. A total of 5,832 questionnaires from the adolescents (94% of the approached students) and 3,413 questionnaires from their parents (55% of the approached parents) could be used for the evaluation. The mean age of the adolescents was 14.8 years (SD = 0.73). To match the age distribution between the two samples, only adolescents between 13.5 and 16.5 years of the BELLA study were included in the comparison (see Table 4). The results showed that self-reported prevalence of both self-mutilation/suicide attempts and suicidal thoughts was more than four times higher in the anonymous questionnaire-

**Table 4** Comparison between the prevalence of the interview based assessment in the BELLA study and the anonymous assessment in the Heidelberg School Study

	BELLA (13.5–16.5 years)		Heidelberg school study	
	Yes	95% CI	Yes	95% CI
Self-report				
Self-mutilation/suicide attempts	3.0%	(1.8–5.0)	12.8%	(12.0–13.7)
Suicidal thoughts	3.2%	(1.9–5.3)	13.4%	(12.5–14.3)
Parent-report				
Self-mutilation/suicide attempts	1.9%	(0.9–3.8)	2.0%	(1.6–2.6)
Suicidal thoughts	2.5%	(1.4–4.6)	2.9%	(2.4–3.5)

based assessment than in the interview. In contrast, the parent-reported prevalence is similar for the two assessment methods.

## Discussion

In this study, self-mutilation and/or suicidal attempts within the last six months were reported by 2.9% of the children 11–17 years of age. Furthermore, 3.8% reported suicidal thoughts. The prevalence rates obtained from the parents were lower, but since the confidence intervals between self- and parent-ratings overlapped, this difference could be due to random variations. The prevalence of self-mutilation/suicidal attempts in children below 11 years of age was very rare, but the occurrence of suicidal thoughts was very similar to the rate in adolescents.

Comparisons of prevalence rates of self-mutilation and suicidal behaviour between studies are difficult due to the differences in samples and methods. Differences in prevalence rates may result from different assessment methods, such as whether or not the assessment was done anonymously. Additionally, there are differences in the extent of reported problems depending on the person rating (self- vs. parent-ratings). Compared with the findings from the Heidelberg School Study [5], the prevalence rates found in the BELLA study were relatively low for self-mutilation/suicide attempts and suicidal thoughts. Only the parent-ratings demonstrated prevalence rates that were approximately equal between studies. The self-reported prevalence of both items was more than four times higher in the anonymous assessment in the Heidelberg School Study compared to the interviews conducted in the BELLA Study. Compared to a recent study, Steinhausen et al. [27] found a prevalence rate of 3.2% for suicidal behaviour (self-mutilation/suicide attempts) and 10.8% for suicidal thoughts in their survey on 16 year old adolescents from the general population in Switzerland. Information on suicidal behaviour was collected using the same self-report instrument (YSR) used in this study.

The lack of agreement between the reports of the parents (mostly mothers) and self-reports has been found in other population-based studies in young people [29]. Velez and Cohen [29] concluded that the fact that parents were not aware of the suicide attempts of their children may be construed as evidence

of the triviality of the attempts. The validity of the children's report, however, is provided from evidence of similarity in the presence of psychiatric correlates of the reported suicidal attempts with those typically found in clinical populations [13, 29]. According to Steinhausen [27], this provides sufficient evidence that the adolescent's perception of him/herself, rather than the perception of the parents, is a better indicator of psychopathology in this age range.

Unlike findings in other studies [13], no differences in gender could be found in the prevalence of self-reported self-mutilation/suicide attempts. In accord with previous studies [4], however, a higher representation of suicidal thoughts was found in female adolescents. Furthermore, the strong association between overall mental health problems and suicidal behaviour found in this study supports the findings of other studies [4]. In approximately 80% of community and referred cases of suicide attempts, additional psychopathological conditions have been reported [4]. As expected, the extent of mental health problems was strongly associated with impairments in health-related quality of life. In the present study, a strong link between suicidal behaviour and symptoms of depression and anxiety could be found, confirming findings from other studies [13]. Furthermore, a strong association was found between suicidal behaviour and symptoms of hyperactivity measured using the Conners' scale. Although several studies [4] have found an association between impulsivity and adolescent suicidal behaviour, more studies are needed to provide further evidence for an association with ADHD. Our results also indicate a relationship between adverse familial background factors and suicidal behaviour, which supports the findings of several other studies on family-environmental factors [4]. Comprehensive efforts are needed in order to establish prevention and intervention strategies for the youth with suicidal tendencies. An important step in this direction could be made with school-based programs [19].

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

## References

1. Arbeitsgruppe Deutsche Child Behavior Checklist (1998) Elternfragebogen über das Verhalten von Kindern und Jugendlichen; deutsche Bearbeitung der Child Behavior Checklist (CBCL/4-18). Arbeitsgruppe Kinder-, Jugend- und Familiendiagnostik, Köln
2. Bae S, Ye R, Chen S, Rivers PA, Singh KP (2005) Risky behaviors and factors associated with suicide attempt in adolescents. *Arch Suicide Res* 9:193–202
3. Birmaher B, Khetarpal S, Brent D, Cully M, Balach L, Kaufman J, Neer SM (1997) The screen for child anxiety related emotional disorders (SCARED): scale construction and psychometric characteristics. *J Am Acad Child Adolesc Psychiatry* 36:545–553
4. Bridge JA, Goldstein TR, Brent DA (2006) Adolescent suicide and suicidal behavior. *J Child Psychol Psychiatry* 47:372–394

5. Brunner R, Parzer P, Haffner J, Steen R, Roos J, Klett M, Resch F (2007) Prevalence and psychological correlates of occasional and repetitive deliberate self-harm in adolescents. *Arch Pediatr Adolesc Med* 161:641–649
6. Cohen J (1988) *Statistical power analysis for the behavioral science*. Lawrence Erlbaum Associates Publishers, Hillsdale
7. Conners K (1996) *Conners' rating scale-revised*. Technical manual. Multi-Health Systems Inc., New York
8. Döpfner M, Lehmkuhl G (2000) Diagnostik-System für psychische Störungen im Kindes- und Jugendalter nach ICD-10 und DSM-IV (DISYPS-KJ). Huber, Bern
9. Evans E, Hawton K, Rodham K, Deeks J (2005) The prevalence of suicidal phenomena in adolescents: a systematic review of population-based studies. *Suicide Life Threat Behav* 35:239–250
10. Faulstich ME, Carey MP, Ruggiero L, Enyart P, Gresham F (1986) Assessment of depression in childhood and adolescence: an evaluation of the Center for Epidemiological Studies Depression Scale for Children (CES-DC). *Am J Psychiatry* 143:1024–1027
11. Flouri E (2005) Psychological and sociological aspects of parenting and their relation to suicidal behavior. *Arch Suicide Res* 9:373–383
12. Goodman R, Meltzer H, Bailey V (1998) The strengths and difficulties questionnaire: a pilot study on the validity of the self-report version. *Eur Child Adolesc Psychiatry* 7:125–130
13. Gould MS, Greenberg T, Velting DM, Shaffer D (2003) Youth suicide risk and preventive interventions: a review of the past 10 years. *J Am Acad Child Adolesc Psychiatry* 42:386–405
14. Hallfors DD, Waller MW, Ford CA, Halpern CT, Brodish PH, Iritani B (2004) Adolescent depression and suicide risk: association with sex and drug behavior. *Am J Prev Med* 27:224–231
15. Hawton K, Arensman E, Wasserman D, Hulten A, Bille-Brahe U, Bjerke T, Crepet P, Deisenhammer E, Kerkhof A, De Leo D, Michel K, Ostamo A, Philippe A, Querejeta I, Salander-Renberg E, Schmidtke A, Temesvary B (1998) Relation between attempted suicide and suicide rates among young people in Europe. *J Epidemiol Community Health* 52:191–194
16. Hawton K, Rodham K, Evans E, Weatherall R (2002) Deliberate self harm in adolescents: self report survey in schools in England. *BMJ* 325:1207–1211
17. Kamtsiuris P, Lange M, Schaffrath Rosario A (2007) *Der Kinder- und Jugendgesundheitsurvey (KiGGS): Stichprobendesign, Response und Nonresponse-Analyse*. Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 50:547–556
18. Levy PS, Lemeshow S (1999) *Sampling of Populations*. Wiley, New York
19. Portzky G, van Heeringen K (2006) Suicide prevention in adolescents: a controlled study of the effectiveness of a school-based psycho-educational program. *J Child Psychol Psychiatry* 47:910–918
20. Rao JNK, Scott AJ (1984) On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. *Ann Stat* 12:46–60
21. Ravens-Sieberer U, Gosch A, Rajmil L, Erhart M, Bruil J, Duer W, Auquier P, Power M, Abel T, Czemy L, Mazur J, Czimbalmos A, Tountas Y, Hagquist C, Kilroe J, European KIDSCREEN Group (2005) KIDSCREEN-52 quality-of-life measure for children and adolescents. *Expert Rev Pharmacoecon Outcome Res* 5:353–364
22. Ravens-Sieberer U, Wille N, Bettge S, Erhart M (2007) Psychische Gesundheit von Kindern und Jugendlichen in Deutschland. *Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz* 50:871–878
23. Ravens-Sieberer U, Wille N, Erhart M, Bettge S, Wittchen H-U, Rothenberger A, Herpertz-Dahlmann B, Resch F, Hölling H, Bullinger M, Barkmann C, Schulte-Markwort M, Döpfner M as the BELLA study group (2008) Prevalence of mental health problems among children and adolescents in Germany: results of the BELLA study within the National Health Interview and Examination Survey. *Eur Child Adolesc Psychiatry* 17(Suppl1):22–33
24. Rothenberger A, Becker A, Erhart M, Wille N, Ravens-Sieberer U, BELLA study group (2008) Psychometric properties of the parent strengths and difficulties questionnaire in the general population of German children and adolescents: results of the BELLA study. *Eur Child Adolesc Psychiatry* 17(Suppl1):99–105
25. StataCorp (2007) *Stata Statistical Software: Release 10*. StataCorp, College Station
26. Steele MM, Doey T (2007) Suicidal behaviour in children and adolescents. part 1: etiology and risk factors. *Can J Psychiatry* 52:215–233
27. Steinhausen HC, Bosiger R, Metzke CW (2006) Stability, correlates, and outcome of adolescent suicidal risk. *J Child Psychol Psychiatry* 47:713–722
28. Thompson EA, Mazza JJ, Herting JR, Randell BP, Eggert LL (2005) The mediating roles of anxiety depression, and hopelessness on adolescent suicidal behaviors. *Suicide Life Threat Behav* 35:14–34
29. Velez CN, Cohen P (1988) Suicidal behavior and ideation in a community sample of children: maternal and youth reports. *J Am Acad Child Adolesc Psychiatry* 27:349–356
30. Wille N, Bettge S, Ravens-Sieberer U, BELLA study group (2008) Risk and protective factors for children's and adolescents' mental health: results of the BELLA study. *Eur Child Adolesc Psychiatry* 17(Suppl1):133–147