Original Article

Depressive Symptoms in Adolescents

Prevalence and Associated Psychosocial Features in a Representative Sample

Lutz Wartberg, Levente Kriston, Rainer Thomasius

Summary

Background: In this study, we determined the current prevalence of depressive symptoms in adolescents in Germany.

Methods: A sample of 1001 adolescents aged 12 to 17 that was representative for Germany was surveyed in August and September 2017 through telephone interviews about depressive symptoms in the two weeks leading up to the interview and about the subjects' psychosocial features. The instrument that was used, called DesTeen, includes questions about depressed mood, loss of interest, loss of energy, feelings of worthlessness, guilt feelings, and cognitive symptoms.

Results: Prevalences could be estimated and associated factors could be determined in a subset comprising 988 of the original 1001 subjects (mean age 14.58 years, 48.4% female). The estimated point prevalence of depressive symptoms (summated DesTeen score ≥ 14) in adolescents aged 12 to 17 was 8.2% (95% confidence interval [6.5; 9.9]). Girls (11.6% [95% CI 8.8; 14.4]) were more commonly affected than boys (5.0% [95% CI 3.1; 6.9]), and this difference was statistically significant ($p < 0.001$). Depressive symptoms were more common with female sex, older age, poorer scholastic performance, lower interpersonal trust, more negative body image, more problematic use of social media or computer games, and lower family functioning. A multivariable regression model explained approximately one-third of the variation among groups (Nagelkerke's $R^2 = 0.35$).

Conclusion: A substantial percentage of German adolescents suffers from depressive symptoms. This study was the first to show certain associations, such as that between depressive symptoms in adolescence and the problematic use of social media in German youth.

Cite this as:

Wartberg L, Kriston L, Thomasius R: Depressive symptoms in adolescents—prevalence and associated psychosocial features in a representative sample. *Dtsch Arztebl Int* 2018; 115: 549–55. DOI: 10.3238/arztebl.2018.0549

Unipolar depressive disorders are among the most common mental health disorders in adolescents (1). According to the World Health Organization's Global Burden of Disease study, the effects of this condition are already clearly apparent during adolescence (2). Given its widespread nature and potentially disastrous consequences (among others an increased risk of suicidality [3]; however, empirical data specific to adolescents are scarce), it has been suggested to treat adolescent depression as a Global Health Priority (4). Adolescent depression is thought to be caused by a combination of biological, psychological, and social factors. According to Naab et al. (5), the following key psychosocial risk factors have been identified:

- Parental neglect
- Problematic peer relations and
- Family problems.

A meta-analysis found a prevalence of depression among 13- to 18-year-olds of 5.6% (6). In the included primary studies, prevalences from acute prevalence to 12-month prevalence had been reported. According to the results of this meta-analysis (6), female adolescents were more frequently affected by depression than male adolescents (5.9% vs 4.6%). In numerous studies, this sex difference in the prevalence of depressive disorders has already been demonstrated empirically for children and adolescents. For Germany, the most recent prevalence estimate which is based on a representative sample is available from the BELLA study (7). Data were collected between May 2003 and May 2006. According to Bettge et al. (7), self-reports of 11- to 17-year-olds revealed that 9.7% of girls and 4.7% of boys were affected by depressive symptoms. However, such a positive screening finding does not mean that these respondents had a depressive disorder. New BELLA data from a longitudinal follow-up of the sample are expected to become available in 2018.

While Costello et al. (6) found no increase in the prevalence rates of depressive disorders among children and adolescents born between 1965 and 1996, several studies from various countries have been published in recent years, reporting increases in the occurrence of depressive symptoms among adolescents (8–11). These trend statements were typically based on data from representative cross-sectional studies, conducted at various survey time points. For the period between 1997 and 2006, an increase in self-reported depressive symptoms among Icelandic

German Center for Addiction Research in Childhood and Adolescence (DZSKJ), University Medical Center Hamburg-Eppendorf, Hamburg: PD Dr. phil. Dipl.-Psych. Lutz Wartberg, Prof. Dr. med. Rainer Thomasius

Department of Medical Psychology, University Medical Center Hamburg-Eppendorf (UKE), Hamburg: PD Dr. phil. Dipl.-Psych. Levente Kriston

The clinical perspective

As in adults, depression in adolescents is characterized by 3 core symptoms: (I) low mood, sadness, (II) reduced ability to feel joy to the extent of joylessness, (III) decreased energy to the extent of lack of energy, increased fatigability (3, 5, 32). The manifestation of depressive symptoms differs with age between children and adolescents (3) and adolescents frequently experience other additional symptoms which may make it more difficult to diagnose depression (5). The adolescent symptoms include self-harm behavior, loss of interest, lower self-esteem, fear of the future, and potentially suicidality, leading to social withdrawal or impaired performance at school or in training (3, 5). In Germany, the diagnosis is based on the International Classification of Mental and Behavioral Disorders of the World Health Organization (ICD-10) (33). In order to establish the diagnosis of "depressive episode" according to ICD-10, at least four of the following ten symptoms must be sustained for at least two weeks: depressed mood, loss of interest, decreased energy, reduced self-esteem, self-reproaches/guilt feelings, recurrent thoughts of death, diminished ability to concentrate, psychomotor agitation, sleep disturbance, decreased or increased appetite (32, 33). If four of the ten ICD-10 symptoms are present, the patient can be diagnosed with a "mild depressive episode", if five to six criteria are met with a "moderate depressive episode", and if at least seven symptoms are met with a "severe depressive episode". When establishing the diagnosis, the degree of impairment in everyday life (32) and potentially a "playing down" of symptoms (dissimulation, impaired awareness of illness) by adolescents has to be taken into account (5). According to the current clinical guideline on the treatment of depression in adolescents, psychotherapy (cognitive behavioral therapy, interpersonal psychotherapy) is recommended for mild to moderate depression and combination therapy (psychotherapy and pharmacotherapy) for severe depression (34).

girls (but not boys) and for both sexes an increased utilization of healthcare services provided by psychiatrists, psychologists and social workers was reported (8). Among female Finnish adolescents, a significantly higher prevalence of severe depression was found when the depression scores for the years 2010/2011 (girls: 4.7%/boys: 2.2%) and 2000/2001 (girls: 4.0%/boys: 2.1%) were compared (9). Von Soest and Wichstrøm (10) found an increased proportion of Norwegian adolescents with severe depressive symptoms when comparing the years 2002 (girls: 11.4%/boys: 6.1%) and 1992 (girls: 8.8%/boys: 2.9%). However, the difference between the findings for 2010 (girls: 13.4%/boys: 5.5%) and the results for 2002 was not statistically significant (10). Mojtabai et al. (11) studied the development of the 12-month prevalences of major depression diagnoses among US adolescents and reported higher prevalence rates for 2014 (11.3%) compared to 2005 (8.7%). By contrast, no increase in the 12-month prevalence of major depression diagnoses between 2000 and 2014 was found among Canadian adolescents. However, the prevalence of self-reported mood disorder diagnoses established by health professionals showed an increase from 2003 to 2014 (12). In summary, the available data on the question whether internationally the numbers of adolescents with symptoms of depression has increased are inconclusive.

When interpreting prevalence estimates in population samples it should be taken into account that depressive symptoms (especially due to variations in the severity of the conditions) do not necessarily equate with need for treatment (13), which can be expected to be lower. However, given that adolescent depression (at least of longer duration) is a strong predictor of mental health problems in adult life (14), it makes sense from a public health perspective to assess the scale on which adolescents are already affected by depressive symptoms to be able to offer early preventative or interventional measures or to reduce or increase the extent of such offerings on the basis of epidemiological findings.

The aims of our study were to determine:

- The current point prevalence of depressive symptoms among adolescents in Germany and
- Which sociodemographic and psychosocial features are associated with depressive symptoms in adolescents.

Methods

Data collection

Data were collected by means of a telephone survey conducted by a market research and opinion polling company (Forsa) in August and September 2017. A total of 1001 adolescents were included in the survey (a random sample of 1698 12- to 17-year-olds were invited to participate in the survey; consequently, the participation rate was 59.0%). In preparation, households were selected from the ADM Telephone Master Sample by multi-stage systematic random selection and

TABLE 1

Sociodemographic and psychosocial characteristics of the total sample and of adolescents without and with depressive symptoms

Variable	Total sample (n = 988) % or M (SD)	Adolescents without depressive symptoms (n = 907) % or M (SD)	Adolescents with depressive symptoms (n = 81) % or M (SD)
Sex	48.4% (girls) 51.6% (boys)	46.6% (girls) 53.4% (boys)	68.4% (girls) 31.6% (boys)
Age ^{*1}	14.58 (1.68)	14.54 (1.68)	15.05 (1.67)
Performance at school ^{*2}	7.31 (2.27)	7.24 (2.23)	8.11 (2.47)
Interpersonal trust ^{*3}	3.66 (0.78)	3.71 (0.76)	3.12 (0.74)
Negative body image ^{*4}	6.30 (2.63)	6.02 (2.45)	9.36 (2.64)
Problematic use of social media ^{*5}	1.08 (1.34)	0.99 (1.26)	2.14 (1.67)
Problematic use of computer games ^{*6}	1.22 (1.57)	1.15 (1.50)	1.95 (2.03)
Family functioning ^{*7}	8.83 (1.55)	8.94 (1.42)	7.60 (2.31)

^{*1} in years (range: 12 to 17); ^{*2} sum of 3 school grades (range: 3 to 18); ^{*3} mean score KUSIV3 questionnaire (range: 1 to 5);

^{*4} sum score of 3 questions on negative body image (range: 3 to 15); ^{*5} sum score SMDS questionnaire (range: 0 to 9); ^{*6} sum score IGDS questionnaire (range: 0 to 9);

^{*7} sum score Family APGAR questionnaire (range: 0 to 10); M: mean; SD: standard deviation

then contacted and asked whether 12- to 17-year-olds were living in the household and whether they agreed to being contacted again by phone. The average time required to conduct the telephone interview and collect the data was almost 17 minutes and the respondents were children and adolescents from Germany (age range 12 to 17 years; in the following, these will be covered collectively under the term “adolescents”). In order to achieve representativeness for the age group 12 to 17 years in Germany, the market research company weighted the sample by sex, age and region (eastern federal states/western federal states) based on the official current population statistics of the German Federal Statistical Office (as of 31 December 2015) after completion of data collection.

Survey methods

The validated Depression Screener for Teenagers (DesTeen, [15]) was used with the recommended cut-off value of ≥ 14 (16, p. 1307) to collect data on depressive symptoms among adolescents. Data on the parameter “interpersonal trust” were collected using the Interpersonal Trust short scale (KUSIV3 [17]) and on the subjective body image using 3 questions from the body image questionnaire (18). The problematic use of social media (websites of social networks, messengers, etc.) was assessed using the Social Media Disorder Scale (SMDS) (19) and the problematic use of computer games using the Internet Gaming Disorder Scale (IGDS) (20). Family functioning was measured using the Family APGAR questionnaire (21). Key sociodemographic characteristics, such as sex and age of the adolescents, and academic achievement were also recorded.

Data analysis

In order to estimate the point prevalence of depressive symptoms in adolescents, relative frequencies with 95% confidence intervals [95% CI] were calculated, first for the weighted total sample and then stratified according to sex (the weight variable was adjusted for each subgroup). In 13 of the 1001 surveyed persons (1.3% of the sample), there were altogether 16 missing values in the DesTeen items, making it impossible to calculate the respective questionnaire’s sum score. In view of the low absolute number (16 of a total of 14 014 entries or 0.1%) the missing values were not imputed. All statistical analyses on depressive symptoms were performed without the 13 respondents with missing DesTeen sum scores, i.e. based on 988 cases. For comparisons of groups (for example, boys vs. girls) the chi-square test was used; for independent samples we used the t-test. Associations between the dependent variable (two categories: depressive symptoms not present versus present) and the independent variables (sex, age, academic achievement, interpersonal trust, body image, problematic use of social media or computer games, as well as family functioning) were evaluated using logistic regressions (forced entry method, also in the weighted data set). First, bivariate associations between depressive symptoms and each of the various characteristics were calculated, followed by a multivariable regression analysis with all independent variables included in one model. The statistical software package SPSS version 22.0 (IBM Inc., Armonk, NY, USA) was used for all calculations. In line with internationally accepted conventions, the level of statistical significance was set at $\alpha = 0.05$.

TABLE 2

Association between sociodemographic and psychosocial aspects and depressive symptoms in a representative German sample of adolescents (all associations were first evaluated in bivariate models and in the next step in a full model)

Variable	Bivariate regression analyses Depressive symptoms, odds ratio (95% CI)	Multivariable regression analysis Depressive symptoms, adjusted odds ratios (95% CI)
Sex ^{*1}	2.48*** [1.53; 4.04]	2.36* [1.16; 4.80]
Age ^{*2}	1.20* [1.05; 1.38]	1.35** [1.11; 1.64]
Performance at school ^{*3}	1.18** [1.07; 1.31]	1.04 [0.91; 1.20]
Interpersonal trust ^{*4}	0.40*** [0.30; 0.53]	0.74 [0.50; 1.08]
Negative body image ^{*5}	1.54*** [1.41; 1.68]	1.38*** [1.24; 1.55]
Problematic use of social media ^{*6}	1.60*** [1.39; 1.83]	1.38** [1.11; 1.71]
Problematic use of computer games ^{*7}	1.29*** [1.13; 1.48]	1.13 [0.92; 1.37]
Family functioning ^{*8}	0.69*** [0.62; 0.77]	0.81** [0.69; 0.95]
Nagelkerke's R ²	–	0.35

* p<0.05; ** p<0.01; *** p<0.001

^{*1} Sex coding: 0 = male, 1 = female. Interpretation of this finding: Girls have an increased chance of being affected by depressive symptoms compared to boys.

^{*2} Unit: per year (range: 12 to 17). Interpretation of this finding: Older adolescents have an increased chance of being affected by depressive symptoms compared to younger adolescents.

^{*3} Unit: per scale point (sum of 3 school grades, range: 3 to 18). Interpretation of this finding: Adolescents with poorer performance at school have an increased chance of being affected by depressive symptoms compared to adolescents with better performance at school (when all variables are taken into account, this result is no longer detectable).

^{*4} Unit: per scale point (mean of KUSIV3, range: 1 to 5). Interpretation of this finding: Adolescents with higher interpersonal trust have a decreased chance of being affected by depressive symptoms compared to adolescents with lower interpersonal trust (when all variables are taken into account, this result is no longer detectable);

^{*5} Unit: per scale point (sum score negative body image, range: 3 to 15). Interpretation of this finding: Adolescents with more negative body image have an increased chance of being affected by depressive symptoms compared to adolescents with more positive body image;

^{*6} Unit: per scale point (sum score SMDS, range: 0 to 9). Interpretation of this finding: Adolescents with more problematic use of social media have an increased chance of being affected by depressive symptoms compared to adolescents with less problematic use of social media;

^{*7} Unit: per scale point (sum score IGDS, range: 0 to 9). Interpretation of this finding: Adolescents with more problematic use of computer games have an increased chance of being affected by depressive symptoms compared to adolescents with less problematic use of computer games (when all variables are taken into account, this result is no longer detectable);

^{*8} Unit: per scale point (sum score Family APGAR, range: 0 to 10). Interpretation of this finding: Adolescents with better family relations have a reduced chance of being affected by depressive symptoms compared to adolescents with poorer family relations.

The statistical measure Nagelkerke's R² explains the proportion of the variation of being a member of one of the two groups.

Detailed information about the survey instruments used are provided in the *eMethods*.

Results

Table 1 lists the sociodemographic and psychosocial characteristics of the 988 12- to 17-year-olds included in the analysis. As expected (given the age range of the sample), most of the adolescents still attended school at the time of the survey (926 cases [93.7%]). A total of 45 (4.6%) surveyed adolescents were in vocational training, 6 (0.6%) were in military service or working as volunteers in the German federal voluntary service, 4 (0.4%) reported to be unemployed or looking for work, 1 (0.1%) was a student at a university/university of applied sciences, and another 6 (0.6%) respondents selected the answer option "Other". The 62 adolescents (6.3%) who were no longer attending school were asked for supplementary information about their highest educational attainment. One person (0.1% of the sample) had not obtained a school leaving certificate, 1 (0.1%) had a special-school leaving certificate ("Förderschulabschluss"), 17 (1.7%) a lower secondary school-leaving certificate ("Hauptschulabschluss"), 35 (3.6%) a secondary school-leaving certificate ("Realschulabschluss"), 7 (0.7%) a university of applied sciences or general university entrance qualification ("Fachhochschulreife"/"Abitur"), and 1 (0.1%) had acquired another school-leaving certification (with these results, the age of the respondents at the time of

the survey and the percentage of the sample still attending school are to be taken into account).

Altogether 81 adolescents screened positive for depressive symptoms (sum score of the DesTeen ≥ 14). Accordingly, the estimated prevalence of depressive symptoms among adolescents in Germany is 8.2% (point prevalence, [95% CI: 6.5; 9.9]). Girls (11.6% [8.8; 14.4]) reported depressive symptoms more frequently than boys (5.0% [3.1; 6.9]) ($\chi^2 = 14.12$, $df = 1$, $p < 0.001$). Respondents who screened positive were statistically significantly older than those with negative screening results ($t = 2.61$, $df = 986$, $p = 0.009$).

Bivariate regression analyses showed statistically significant associations between depressive symptoms and (*Table 2*):

- Female sex
- Older age
- Poorer performance at school
- Lower interpersonal trust
- More negative body image
- More problematic use of social media or computer games, as well as
- Lower satisfaction with family relations.

In a full model, comprising all independent variables, statistically significant associations were found

between depressive symptoms and female sex, older age, more negative body image, more problematic use of social media, and lower satisfaction with family relations.

In this multivariable regression analysis, about one third of the variation was explained by being a member of one of the two groups (adolescents without versus adolescents with depressive symptoms) (Nagelkerke's $R^2 = 0.35$, $\chi^2 = 120.20$, $p < 0.001$).

Discussion

In this study, the prevalence of depressive symptoms was determined in a representative sample of German adolescents. The estimated prevalence revealed that a substantial percentage of the sample (8.2%)—equivalent to about one in twelve adolescents in Germany—experienced depressive symptoms (point prevalence). Significant differences were found between the sexes, with about one in nine girls being affected but only one in 20 boys. Compared to the last available findings for Germany, reported by Bettge et al. (7), which were based on a representative sample, the percentage of male adolescents with depressive symptoms [2017: 5.0% vs. 2008: 4.7% (7)] remained almost unchanged, while a slight increase in the estimated prevalence was observed among female adolescents [2017: 11.6% vs. 2008: 9.7% (7)]. However, the use of different screening instruments in the two studies limited the comparability of the results. Besides the two distinct questionnaires with different cut-off values, the main difference between the studies is that Bettge et al. (7) collected additional data on the degree of impairment resulting from the psychological problems and combined this aspect with a positive screening result for depressive symptoms. By contrast, our study made exclusive use of the screening instrument DesTeen (which, however, was validated during its development against a structured diagnostic interview; see *eMethods*). While depressive symptoms are indicative of subjective burden and burden of disease in those affected (potentially including their relatives), they cannot be equated with the diagnosis of depression. Based on their analysis of data from a German statutory health insurance (Gmünder Ersatzkasse), Hoffmann et al. (22) reported that in 2009 3.1% of the 12- to 18-year-old insured persons were diagnosed with depression in an outpatient setting (with this administrative prevalence, however, it should be noted that most likely not all affected adolescents received outpatient treatment or were diagnosed with depression even if they suffered from the disorder).

Internationally, the results have been inconsistent, with some studies indicating an increase in depressive symptoms among adolescents (11) and others not (12). It is conceivable that there is no uniform international trend and a more differentiated analysis is required taking additional country-specific aspects into account. For example, the study of Torikka et al. (9) showed that the socioeconomic status of the family of origin plays a key role. The findings of our

study indicate that in Germany depressive symptoms are not rarer among adolescents than among adults, because in the German Health Interview and Examination Survey for Adults (DEGS1) a point prevalence of 8.1% was reported for a representative sample of 18- to 79-year-olds (23). However, when comparing the findings for adults with those for adolescents the methodological limitation has to be taken into account that in DEGS1 (23) another screening instrument (PHQ-9, [24]) with a different cut-off value (≥ 10) was used.

Several of the identified correlates of depressive symptoms among adolescents (female sex, older age, more negative body image, and poorer family functioning) are backed by sound empirical evidence (for example [6, 25, 26]). Especially the association between problematic use of social media and depressive symptoms among adolescents is a new field of research (27) and was demonstrated for Germany for the first time, whereas the associations between problematic computer game behavior and depression had already been empirically observed before (28). Furthermore, relationships between the various associated factors, such as, for example, use of social media by adolescents and impact on their body image, are of great interest and should be further evaluated in future longitudinal studies with regard to their effect on the development of depressive symptoms.

This study has a number of limitations. Data on depressive symptoms were collected using a screening questionnaire and not by a structured clinical interview which would have allowed more precise data acquisition and establishment of diagnosis. However, larger epidemiological studies often use questionnaires instead of interviews (e.g., also in [7] and [23]) and the survey instrument used was validated against a structured diagnostic interview (16). The prevalence estimates are based on self-assessments of adolescents which are considered more reliable compared to external assessments (for example by parents) (29); however, it would have facilitated the assessment of clinical significance if data on the impairment by depressive symptoms would also have been collected. In addition to the correlates studied, there are other relevant factors which were not included in the survey to save resources, for example, comorbid mental disorders or chronic somatic conditions. Furthermore, the survey did not cover the socioeconomic background of the family of origin or their migration background. Thus, it cannot be ruled out that these aspects are also of relevance to depressive symptoms in adolescents. While the chosen design of a cross-sectional survey in a representative sample is well suited for estimating prevalence (30), it does not allow to infer causal relationships. For example, performance at school can drop as a result of mental stress, but, on the other hand, it cannot be excluded that psychopathological stress is promoted by, for example, declining performance at school.

Key messages

- According to the data of this study, 8.2% of the 12- to 17-year-olds in Germany were affected by depressive symptoms in 2017.
- Girls (11.6%) reported depressive symptoms significantly more often than boys (5.0%).
- Statistically significant correlates of depressive symptoms among adolescents identified in this study were female sex, older age, poorer performance at school, lower interpersonal trust, more negative body image, more problematic use of social media or computer games, as well as poorer family functioning.
- A limitation of this study is that other potentially relevant factors (comorbid mental disorders or somatic conditions of the adolescents, socioeconomic status of the family of origin, etc.) were not assessed.
- The predictive significance of the identified and other relevant correlates for the development of depressive symptoms among adolescents should be further investigated, especially in longitudinal studies.

Our study produced several important new findings with regard to depressive symptoms. A substantial percentage of 12- to 17-year-olds in Germany is affected by depressive symptoms. In view of the increased risk of chronification of the symptoms into adulthood (31), it appears relevant to supplement or advance existing strategies of primary and secondary prevention for adolescents in the future. Here, the identified correlates (especially the particularly relevant individual psychosocial characteristics negative body image and problematic use of social media) may be of help; however, these should be further assessed—ideally in longitudinal studies—with regard to their predictive significance for the development of depressive symptoms.

Funding

This study was conducted with financial support from the DAK-Gesundheit health insurance.

Conflict of interest statement

The authors declare that no conflict of interest exists.

Manuscript received on 14 January 2018, revised version accepted on 22 May 2018

Translated from the original German by Ralf Thoene, MD.

References

1. Essau CA: Frequency and patterns of mental health services utilization among adolescents with anxiety and depressive disorders. *Depress Anxiety* 2005; 22: 130–7.
2. Mokdad AH, Forouzanfar MH, Daoud F, et al.: Global burden of diseases, injuries, and risk factors for young people's health during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2016; 387: 2383–401.
3. Mehler-Wex C, Köhler M: Depression in children and adolescents. *Dtsch Arztebl Int* 2008; 105: 149–55.
4. Patel V: Why adolescent depression is a global health priority and what we should do about it. *J Adolesc Health* 2013; 52: 511–2.
5. Naab S, Hauer M, Voderholzer U, Hautzinger M: Depressive Störungen bei Jugendlichen: Diagnostik und Therapie. *Fortschr Neurol Psychiatr* 2015; 83: 49–62.
6. Costello EJ, Erkanli A, Angold A: Is there an epidemic of child or adolescent depression? *J Child Psychol Psychiatry* 2006; 47: 1263–71.
7. Bettge S, Wille N, Barkmann C, Schulte-Markwort M, Ravens-Sieberer U; BELLA study group: Depressive symptoms of children and adolescents in a German representative sample: results of the BELLA study. *Eur Child Adolesc Psychiatry* 2008; 17 (Suppl 1): 71–81.
8. Sigfusdottir ID, Asgeirsdottir BB, Sigurdsson JF, Gudjonsson GH: Trends in depressive symptoms, anxiety symptoms and visits to healthcare specialists: a national study among Icelandic adolescents. *Scand J Public Health* 2008; 36: 361–8.
9. Torikka A, Kaltiala-Heino R, Rimpelä A, Marttunen M, Luukkaala T, Rimpelä M: Self-reported depression is increasing among socio-economically disadvantaged adolescents—repeated cross-sectional surveys from Finland from 2000 to 2011. *BMC Public Health* 2014; 14: 408.
10. von Soest T, Wichstrøm L: Secular trends in depressive symptoms among Norwegian adolescents from 1992 to 2010. *J Abnorm Child Psychol* 2014; 42: 403–15.
11. Mojtabai R, Olfson M, Han B: National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics* 2016; 138: e20161878.
12. Wiens K, Williams JV, Lavorato DH, et al.: Is the prevalence of major depression increasing in the Canadian adolescent population? Assessing trends from 2000 to 2014. *J Affect Disord* 2017; 210: 22–6.
13. Patten SB: Major depression prevalence is very high, but the syndrome is a poor proxy for community populations' clinical treatment needs. *Can J Psychiatry* 2008; 53: 411–9.
14. Jonsson U, Bohman H, von Knorring L, Olsson G, Paaren A, von Knorring AL: Mental health outcome of long-term and episodic adolescent depression: 15-year follow-up of a community sample. *J Affect Disord* 2011; 130: 395–404.
15. Pietsch K, Allgaier AK, Frühe B, et al.: Screening for depression in adolescent paediatric patients: validity of the new Depression Screener for Teenagers (DesTeen). *J Affect Disord* 2011; 133: 69–75.
16. Allgaier AK, Krick K, Saravo B, Schulte-Körne G: The Depression Screener for Teenagers (DesTeen): a valid instrument for early detection of adolescent depression in mental health care. *Compr Psychiatry* 2014; 55: 1303–9.
17. Beierlein C, Kemper CJ, Kovaleva A, Rammstedt B: Kurzsкала zur Messung des zwischenmenschlichen Vertrauens: Die Kurzsкала Interpersonales Vertrauen (KUSIV3). Mannheim: GESIS – Leibniz-Institut für Sozialwissenschaften 2012.
18. Clement U, Löwe B: Fragebogen zum Körperbild. Göttingen: Hogrefe 1996.
19. van den Eijnden RJJM, Lemmens JS, Valkenburg PM: The social media disorder scale. *Comput Human Behav* 2016; 61: 478–87.
20. Lemmens JS, Valkenburg PM, Gentile DA: The internet gaming disorder scale. *Psychol Assess* 2015; 27: 567–82.
21. Smilkstein G: The family APGAR: a proposal for family function test and its use by physicians. *J Fam Pract* 1978; 6: 1231–9.
22. Hoffmann F, Petermann F, Glaeske G, Bachmann CJ: Prevalence and comorbidities of adolescent depression in Germany. An analysis of Health Insurance Data. *Z Kinder Jugendpsychiatr Psychother* 2012; 40: 399–404.
23. Busch MA, Maske UE, Ryl L, Schlack R, Hapke U: Prävalenz von depressiver Symptomatik und diagnostizierter Depression bei Erwachsenen in Deutschland – Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1). *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2013; 56: 733–9.
24. Kroenke K, Spitzer RL, Williams JB: The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001; 16: 606–13.
25. Lin HC, Tang TC, Yen JY, et al.: Depression and its association with self-esteem, family, peer and school factors in a population of 9586 adolescents in southern Taiwan. *Psychiatry Clin Neurosci* 2008; 62: 412–20.
26. Almeida S, Severo M, Araújo J, Lopes C, Ramos E: Body image and depressive symptoms in 13-year-old adolescents. *J Paediatr Child Health* 2012; 48: e165–71.
27. Koc M, Gulyagci S: Facebook addiction among Turkish college students: the role of psychological health, demographic, and usage characteristics. *Cyberpsychol Behav Soc Netw* 2013; 16: 279–84.
28. Wartberg L, Kriston L, Thomasius R: The prevalence and psychosocial correlates of internet gaming disorder—analysis in a nationally representative sample of 12- to 25-year-olds. *Dtsch Arztebl Int* 2017; 114: 419–24.

29. Lewis AJ, Bertino MD, Bailey CM, Skewes J, Lubman DI, Toumbourou JW: Depression and suicidal behavior in adolescents: a multi-informant and multi-methods approach to diagnostic classification. *Front Psychol* 2014; 5: Article 766.
30. Klug SJ, Bender R, Blettner M, Lange S: Wichtige epidemiologische Studientypen. *Dtsch Med Wochenschr* 2007; 132: e45–7.
31. Fergusson DM, Horwood LJ, Ridder EM, Beautrais AL: Subthreshold depression in adolescence and mental health outcomes in adulthood. *Arch Gen Psychiatry* 2005; 62: 66–72.
32. Ihle W: Depressive Störungen im Kindes- und Jugendalter – Evidenz- sowie konsensbasierte Diagnostik und Behandlung. *Psychotherapeut* 2016; 61: 535–53.
33. ICD-10-GM 2018 Systematisches Verzeichnis – Internationale statistische Klassifikationen der Krankheiten und verwandter Gesundheitsprobleme. Köln: Deutscher Ärzteverlag 2018.
34. Dolle K, Schulte-Körne G: Clinical practice guideline: the treatment of depressive disorders in children and adolescents. *Dtsch Arztebl Int* 2013; 110: 854–60.

Corresponding author

PD Dr. phil. Dipl.-Psych. Lutz Wartberg
Deutsches Zentrum für Suchtfragen des Kindes- und Jugendalters (DZSKJ)
Universitätsklinikum Hamburg-Eppendorf
Martinistr. 52, 20246 Hamburg, Germany
lwartberg@uke.de

► Supplementary material

For eReferences please refer to:
www.aerzteblatt-international.de/ref3318

eMethods:

www.aerzteblatt-international.de/18m0459

CLINICAL SNAPSHOT

The Peppered Brain Stem

A 33-year-old man presented with complaints of positional vertigo, double vision, and fine motor deficits in the hands. Cranial MRI showed multiple small contrast-enhanced lesions predominantly located in the cerebellum and brain stem (*Figure*), reminiscent of a sprinkling of pepper. We immediately suspected CLIPPERS syndrome, a central nervous system inflammatory disease, and exclusion of other potential causes confirmed this diagnosis. The acronym CLIPPERS stands for “chronic lymphocytic inflammation with pontine perivascular enhancement responsive to steroids”, summarizing the typical characteristics of the disease, for which no cause has yet been ascertained.

Steroid pulse therapy (intravenous methylprednisolone) led to regression and eventually complete resolution of the symptoms. Particularly if the commencement of treatment is delayed, this relapsing–remitting disease may take a severe course, in which case steroid-sparing treatment with immunosuppressants

may become necessary.

Dr. med. Martin Alexander Schaller, Prof. Dr. med. Christian Foerch, Klinik für Neurologie, Goethe-Universität, Frankfurt am Main, martinalexander.schaller@kgu.de

Prof. Dr. med. Marlies Wagner, Institut für Neuroradiologie, Goethe-Universität, Frankfurt am Main

Conflict of interest statement: The authors declare that no conflict of interest exists.

Translated from the original German by David Roseveare

Cite this as: Schaller MA, Foerch C, Wagner M: The peppered brain stem. *Dtsch Arztebl Int* 2018; 115: 555. DOI: 10.3238/arztebl.2018.0555

Supplementary material to:

Depressive Symptoms in Adolescents

Prevalence and Associated Psychosocial Features in a Representative Sample

by Lutz Wartberg, Levente Kriston, and Rainer Thomasius

Dtsch Arztebl Int 2018; 115: 549–55. DOI: 10.3238/arztebl.2018.0549

eReferences

- e1. Schneider S, Unnewehr S, Margraf J (eds.): Diagnostisches Interview bei psychischen Störungen im Kindes- und Jugendalter (Kinder-DIPS). Berlin: Springer 2009.
- e2. American Psychiatric Association: Diagnostic and statistical manual of mental disorders (DSM–IV–TR), 4th edition, text revised. Washington, DC: American Psychiatric Association 2000.

eMETHODS

Information about the survey instruments

The Depression Screener for Teenagers (DesTeen [15]) covers six characteristic groups of symptoms of adolescent depression: depressed mood (3 items), loss of interest (3 items), decreased energy (2 items), reduced self-esteem (2 items), self-reproaches/guilt feelings (2 items), and cognitive symptoms (2 items). The DesTeen questionnaire was developed and validated specifically for this age group at the Ludwig-Maximilians-University of Munich, Germany. Using 14 items (Likert scales, each with four pre-specified answer options), the severity of depressive symptoms is measured for the period of the preceding two weeks (point prevalence) and a sum score is calculated which can range between 0 and 42 (higher scores represent more severe depressive symptoms). The authors of the test recommend a cut-off value of ≥ 14 (16); hence, in this study a DesTeen sum score ≥ 14 was used to define the presence of depressive symptoms. A positive DesTeen screening result for depressive symptoms in this study should not be equated with the diagnosis of depression (this would require that the diagnosis of depression had been established by a physician or psychological psychotherapist). During the development and validation of the instrument, a structured clinical interview (Kinder-DIPS [e1]) was performed and the interview-based diagnoses were used as the gold standard for the validation of the DesTeen. Using the Kinder-DIPS instrument, adolescents were diagnosed with major depression and dysthymic disorder based on the DSM-IV-TR [e2]; in addition, minor depression (according to the criteria listed in Appendix B of the DSM-IV-TR) was documented (15). The DesTeen questionnaire showed a high level of diagnostic accuracy; for example, for “any depressive disorder” according to the Kinder-DIPS (collective category), area under the curve (AUC) values of 0.91 (13) and 0.94 ([16], proof of validity) respectively, were found. For an optimum combination of sensitivity and specificity, the authors of the test recommend a cut-off value of ≥ 14 in the pediatric setting. According to Allgaier et al. (16), this cut-off value ensures that cases of minor depression (p. 1307) or less severe depressive symptoms are excluded.

The Interpersonal Trust Short Scale (KUSIV3, Kurzsкала Interpersonales Vertrauen) measures the self-assessed interpersonal trust of adolescents using 3 items (5-level answer format: 1 = “don’t agree at all”, 2 = “agree a bit”, 3 = “agree somewhat”, 4 = “agree mostly”, 5 = “agree completely”). Based

on the 3 questions of the KUSIV3, a mean score is calculated; a higher score indicates stronger interpersonal trust.

In order to collect data on the subjective body image in the most time-efficient way, 3 of 20 items (5-level answer format: 1 = “does not apply at all”, 2 = “does hardly apply”, 3 = “does partially apply”, 4 = “does largely apply”, 5 = “does fully apply”) from the body image questionnaire (18) were used. From these 3 questions (about satisfaction with their own body shape, about liking themselves on photos, and about the wish to look different), a sum score was calculated; a higher score indicates a more negative body image.

A problematic use of social media (websites of social networks, messengers, etc.) was assessed using the Social Media Disorder Scale (SMDS) (19) and a problematic use of computer games using the Internet Gaming Disorder Scale (IGDS) (20). SMDS and IGDS consists each of 9 questions with binary answer format (0 = “no”, 1 = “yes”) from which a sum score is calculated. A higher score indicates a more problematic use of social media or computer games.

The quality of family relationships/functioning was measured using the Family APGAR test (21). APGAR is an acronym for 5 aspects of family relationships (Adaptability, Partnership, Growth, Affection, Resolve) which were assessed using this questionnaire. The instrument consists of 5 items (3-level answer format: 0 = “hardly ever”, 1 = “some of the time”, 2 = “almost always”) from which a sum score (range: 0 to 10) can be calculated. A higher sum score indicates better family functioning.

To estimate the adolescents’ performance at school, the respondents were asked to add up the grades from their last school report in the subjects German, Math, and first foreign language (here the intention was to prevent any errors the adolescents could make when calculating the means across 3 grades). Corresponding to the conventional German grading scale ranging from 1 (excellent) to 6 (insufficient), higher numbers in this total of grades indicate poorer performance at school. Key sociodemographic characteristics (for example, sex and age of the adolescents) as well as other information on the use of digital media (for example, with regard to how often and how much time was spent for social media, computer games, and YouTube) were also obtained.