



Research paper

Perceived parental support in childhood and adolescence as a tool for mental health screening in students: A longitudinal study in the i-Share cohort



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ABSTRACT

Background: Negative events in childhood are associated with increased risk of mental health problems, and evaluation could help identify students at high risk of mental health disorder. However, childhood adversity measures are difficult to implement in routine care. Perceived parental support in childhood and adolescence may be more easily assessed, as it is a rather neutral and non-intrusive question.

Methods: We retrieved students' health data collected from the French i-Share cohort, in a longitudinal population-based study including 4463 students of 18–24 years of age. Students in this cohort completed a self-reported questionnaire about major psychiatric problems at one-year follow-up.

Results: Among 4463 participants, 26% reported a major mental health problem—including suicidal behavior (17%), major depression (7%), and severe generalized anxiety disorder (15%). Adjusted logistic regression revealed that a lower level of perceived parental support was significantly associated with higher risk of any mental health problem. Compared to students who reported extremely strong perceived parental support, students who perceived no support had a nearly 4-fold higher risk of mental health problems (aOR 3.80, CI 2.81–5.13). Lower levels of perceived parental support were dose-dependently associated with higher incidences of suicidal behavior, major depression, and severe generalized anxiety disorder.

Limitations: Study limitations included a moderate follow-up response rate, and retrospective self-report questionnaires.

Conclusion: Perceived parental support was strongly associated with the incidence of mental health problems among college students. If validated, these results suggest that health professionals should consider using this simple marker to improve mental health risk assessment and screening.

1. Introduction

College students exhibit a high prevalence of mental health problems (Blanco et al., 2008; Wilcox et al., 2010; Auerbach et al., 2016; Auerbach et al., 2018) with many youths experiencing severe depression, anxiety, or suicidal behaviors. In a large study including 13 984 students at 19 universities worldwide, about one-third of the population reported 12-month DSM-IV mental disorders—predominantly major depression episode (18.5%), generalized anxiety disorder (16.7%), or suicidal behavior (8.4% suicidal ideation and 1.0% suicide attempt) (Bruffaerts et al., 2019). Depression and generalized anxiety disorders are often comorbid with suicidal behaviors (Eisenberg et al., 2007). Although a substantial proportion of students suffering from mental problems require psychosocial support, several studies suggest that

most do not receive appropriate care and treatment (Eisenberg et al., 2007; Wilcox et al., 2010; Bruffaerts et al., 2019).

Avoiding aggravation of mental disorders requires early detection, and rapid intervention and care (Garlow et al., 2008; Auerbach et al., 2019; Duffy et al., 2019). However, it is difficult to identify young people who suffer from these problems (Weist et al., 2007; Moore et al., 2015). Determining which students are in need of support or treatment is particularly challenging due to the limited on-campus mental health resources on campus, and because students may be reluctant to disclose information about their mental health.

Familial factors, including life events and intra-familial environment, play a central role in the aetiology of mental health problems, due to both psychosocial and genetic reasons (Turecki and Brent, 2016). Many studies describe an association between psychiatric

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disorders and childhood adversity (Kessler et al., 2010; Green et al., 2010; Bruwer et al., 2014; Björkenstam et al., 2017; Easterlin et al., 2019), such as abuse or maltreatment (Gilbert et al., 2009; Zhu et al., 2019), parental death (Guldin et al., 2015), parental divorce (Lindström and Rosvall, 2015), or parental history of mental health problems (King et al., 2010).

Many studies show that chaotic family environments are associated with low levels of parental support (Levin and Currie, 2010; Bagner and Graziano, 2013; Hugues et al., 2019; Schaan et al., 2019). This relationship can be direct, eg, related to neglect behaviors (Shan et al., 2019) or indirect, eg, when parental mental health problems lead to less effective parenting practices (Taraban et al., 2017; Simpson-Adkins and Daiches, 2018). For example, parental depression is linked to reduced parenting quality (Lovejoy et al., 2000; Wilson and Durbin, 2010).

Family assessment measures are heterogeneous (Falissard et al., 2015) and can be difficult to implement. There remains a need for screening tools that provide rapid and non-intrusive assessment of a person's risk of mental health problems that may require further evaluation and treatment. In contrast, perceived parental support in childhood and adolescence can be easily assessed since it is a rather neutral question. In a previous cross-sectional study of the association between perceived parental support and suicidal thoughts, we found that low levels of perceived parental support were associated with higher risk of suicidal ideation (Macalli et al., 2018). However, this result was limited by the cross-sectional nature of the study.

In the present study, we tested the strength of the association between a one-item assessment of perceived parental support during childhood and adolescence and the one-year risk of major mental health problems within a large sample of college students. Our secondary objective was to compare the relative strength of association between self-reported parental support and objective indicators of childhood adversity.

2. Methods

2.1. Study design, study population and data collection

Our study sample comprised participants in the ongoing internet-based Students' Health Research Enterprise (i-Share) project—a prospective population-based study of students at French-speaking universities and higher education institutions. The aim of i-Share is to investigate student's health with an annual follow-up after inclusion. Recruitment began in 2013. Eligible students had to be officially registered at a university or higher education institute, at least 18 years of age, and able to read and understand French, and had to provide informed consent for participation.

The i-Share enrolment procedure is described elsewhere (Macalli et al., 2018). The self-administered baseline questionnaire collected sociodemographic characteristics, health information, personal and familial histories, living conditions, and consumptions. One year later, students were invited by email to complete the first follow-up questionnaire. Three reminder emails were sent at 14, 28, and 33 days later. As of November 2018, the cohort included a total of 15 040 students.

For the present longitudinal study, we acquired data from a sample of students who participated in the i-Share cohort study between February 2013 and November 2018. Only college students of 18 to 24 years of age were included, as this age range defines young adults according to the World Health Organization (WHO, 2013). The present analyses included only participants who answered the question regarding perceived parental support and who completed the one-year follow-up survey.

2.2. Measures

2.2.1. Outcomes

Outcomes were assessed from the one-year follow-up questionnaire. **Suicidal behavior** included suicidal thoughts or suicidal attempts during the last 12 months. Participants who reported having occasional or frequent suicidal thoughts and/or a suicide attempt were included in the modality “yes” for suicidal behavior. Those who declared no suicidal ideation or suicide attempt were categorized as “no” for suicidal behavior.

Major depression was measured using the 9-item Patient Health Questionnaire (PHQ-9), which is a reliable and valid measure of depression severity over the preceding two weeks. A PHQ-9 score of 5 indicated mild depression, 10 moderate depression, 15 moderately severe depression, and 20 severe depression. We included “major depression disorder” as a binary variable defined as a PHQ-9 score of 15 or higher (moderately severe and severe), and performed sensitivity analyses with depression as a continuous variable (Kroenke et al., 2001).

Generalized anxiety disorder was assessed with the Generalized Anxiety Disorder 7-item (GAD-7) scale, which is a valid and efficient tool to measure anxiety severity over the preceding two weeks. A scores of 5 is the cut-off points for mild anxiety, 10 for moderate anxiety, and 15 for severe anxiety (Spitzer et al., 2006). We included “severe generalized anxiety disorder” as a binary variable defined as a GAD-7 scale score of 15 or higher, and performed sensitivity analyses with generalized anxiety disorder as a continuous variable.

Any mental health problems. Participants with positive scores for either suicidal behavior, major depression, or severe generalized anxiety disorder were coded as having ‘any mental problem’ (‘yes’) and were compared to those who reported none of these problems (‘no’).

2.2.2. Exposure variable

Retrospective assessment of perceived parental support in childhood and adolescence was self-reported in the baseline questionnaire. Participants selected one of five different responses: (1) none, (2) low, (3) moderate, (4) strong, and (5) extremely strong.

2.2.3. Covariates

Potential confounders or modifiers recorded at baseline included age, sex (male, female), parental divorce or separation (yes, no), parental death (yes, no), not living in parental home during childhood (yes, no), difficult economic status during childhood (yes, no), parental history of depression or anxiety (yes, no), parental alcohol abuse history (yes, no), and parental education level for at least one parent (university studies, no university studies).

2.3. Statistical analysis

We first described the overall study sample according to the presence of any mental health problems, and according to the three outcomes separately. Continuous variables are expressed as mean \pm SD. Categorical variables are described as the proportion.

We compared the characteristics of non-respondents and respondents at one year. The study sample and non-respondents differed in the distributions of some sociodemographic and lifestyle habit characteristics, including sex, education sector, and some familial characteristics. Therefore, in all analyses, we performed inverse probability weighting, in which weights represented the probability of being included in the study population estimated from all baseline variable differences between participants and non-participants (Rosenbaum and Rubin, 1983; Austin, 2011). Upon creating the propensity score, we assessed its quality by comparing the distribution of the aforementioned variables between respondents and non-respondents by strata of propensity scores (quartile). Those distributions were not statistically different in each stratum ($P < 0.05$).

To account for missing information for covariates (between 0.1% to 19.6%), we used multiple imputation by chained equation (Van Buuren, 2007; Janssen et al., 2010). This method was based on an algorithm of the Monte Carlo Markov chain method, adapted for imputation on arbitrary or non-monotonic data (Faris et al., 2002). We first analysed the shape of the refusal data, and then we formulated the assumption of missing-at-random data. We hypothesized that the typology of the non-response data was informative, and that it did not occur completely at random, since students declared that they were not willing to answer the question. We performed 10 imputations, and averaged the variable estimates to produce a mean estimate. Finally, we verified that the relative efficiency of the imputation on each variable was greater than 95%.

Since only one measure of the follow-up outcomes was available, we assessed the relationship between perceived parental support and mental health problems using logistic regression analysis, estimating unadjusted odds ratios (OR) and adjusted odds ratios (aOR), with 95% confidence intervals (CI). The exposure variable and covariates were assessed at baseline, and outcomes were assessed at first follow-up. We systematically evaluated model convergence, and tested the assumption of linearity of the logit for the continuous variable (age). We adjusted for potential confounders, including age, gender, and main childhood adversities. We did not adjust for history of psychiatric personality disorders because they were defined as a variable on the causal pathway between exposure and outcome. We tested interactions between perceived parental support and the covariates included in the model.

As we used cut-off points to measure major depression and generalized anxiety disorder, sensitivity analyses were performed to examine the association of perceived parental support with depression (PHQ-9 score) and generalized anxiety disorder (GAD-7 score) as continuous variables. We also performed separate analyses for suicidal ideation and for suicide attempt. Finally, we repeated our analyses with modified adjustment, on complete data with and without non-response propensity weights, and after multiple imputation without non-response propensity weights.

All analyses were performed using SAS version 9.4. Two-sided *P* values of <0.05 were considered statistically significant.

3. Results

Among 13 968 students solicited to participate in the follow-up, 4797 participated (35% response rate). Of these respondents, 284 were excluded because they were not between 18 and 24 years of age. Another 50 students were excluded because they were not willing to answer questions related to perceived parental support. Thus, the final study population included 4463 students (Fig. 1). Supplementary table 1 compares follow-up respondents and non-respondents.

Table 1 presents the sample characteristics. The mean participant age was 20.4 years (± 1.8) and 80% were female. Parental education was high for the majority of the students, and over one-third of the sample indicated scholarship. The most prevalent indicators of childhood adversity were parental depression or anxiety (39%) and parental divorce or separation (30%).

Over one-quarter of the students (26%) reported experiencing a major mental health disorder in the previous year. The 12-month prevalence rates were 17% for suicidal behavior, 7% for major depression, and 15% for severe generalized anxiety disorder. Additionally, over one-quarter of the sample (26%) perceived insufficient parental support (frequency rated as moderate, low, or none) during childhood and adolescence.

Compared with the complete sample, the students exposed to indicators of childhood adversity were more likely to declare psychiatric troubles. The proportion of participants who reported weak perceived parental support (questionnaire responses of moderate, low, and none) was greater among patients with mental health disorders. For instance,

a total lack of perceived parental support was more frequent among participants who reported major depression (7%) or severe generalized anxiety disorder (4%) compared to in the total sample (1%).

Table 2 shows the crude and adjusted OR between perceived parental support during childhood and adolescence and one-year mental health problems, after propensity weighting for non-response and multiple imputations for missing data. The predefined interactions (sex and indicators of childhood adversity) were not statistically significant for any outcome. The unadjusted model demonstrated that lower levels of perceived parental support were significantly associated with any mental health disorders (i.e., suicidal behavior, major depression, or generalized anxiety disorder) compared to no reported mental health problems. Relative to having extremely strong perceived parental support, a total lack of perceived parental support (questionnaire response: none) was associated with strongly increased odds of suicidal behavior compared to no suicidal behavior (OR 3.54, CI 2.61–4.81), major depression compared to mild or moderate depression (OR 10.33, CI 7.49–14.25), and severe generalized anxiety disorder compared to mild or moderate anxiety (OR 5.19, CI 3.87–6.97) ($P < 0.0001$ for all).

The multivariate model was adjusted for age, sex, parental divorce or separation, parental death, difficult economic status during childhood, parental depression or anxiety, parental alcohol abuse, not living in parental home during childhood, and parental education level. Multiple adjustment reduced the point values of the estimators, which remained statistically significant. The trend was also preserved after adjustment. Perceived parental support was associated with one-year incidence of mental health problems (aOR 3.80, CI 2.81–5.13, for those who perceived no support). A total lack of perceived parental support was associated with a 2-fold higher risk of suicidal behaviour (aOR 2.67, CI 1.92–3.69), a nearly 4-fold greater risk of severe generalized anxiety disorder (aOR 3.96, CI 2.88–5.44), and an over 7-fold higher risk of major depression (aOR 7.43, CI 5.25–10.53) compared to individuals who perceived extremely strong parental support ($P < 0.0001$). We also identified a dose-response relationship between level of perceived parental support and each mental health disorder. The aOR for major depression was 1.00 (CI 0.82–1.21) for strong perceived parental support, 2.05 (CI 1.68–2.51) for moderate, 3.03 (CI 2.37–3.88) for low, and 7.43 (CI 5.25–10.53) for no perceived parental support.

Secondary analyses revealed that insufficient perceived parental support was generally associated with higher risks compared to indicators of childhood adversity (Table 3). Thus, in adjusted models, parental divorce and parental death were not significantly associated with major depression or severe generalized anxiety disorder. Additionally, an adjusted model showed that parental depression or anxiety was associated with major depression (aOR 2.09, CI 1.62–2.70); however, the point estimate of low perceived parental support was apparently higher (aOR 3.03, CI 2.37–3.88).

In sensitivity analyses, when PHQ-9 and GAD-7 scores were analysed as continuous variables, they continued to show a statistically significant association with perceived parental support. The mean PHQ-9 and GAD-7 scores increased with decreased levels of perceived parental support (supplementary table 2). Separate analyses for suicidal ideation and suicide attempt revealed that each outcome was dose-dependently associated with perceived parental support (supplementary table 3). Modifying the adjustment such that only childhood adversities remained statistically significant did not change the global results. Finally, we repeated our analyses using complete data with and without non-response propensity weighting, and after multiple imputation without non-response propensity weights. The estimates obtained from these models were similar to those obtained from the main model (supplementary table 4). Importantly, our main analyses showed a tighter confidence interval, supporting the robustness of our methods and findings.

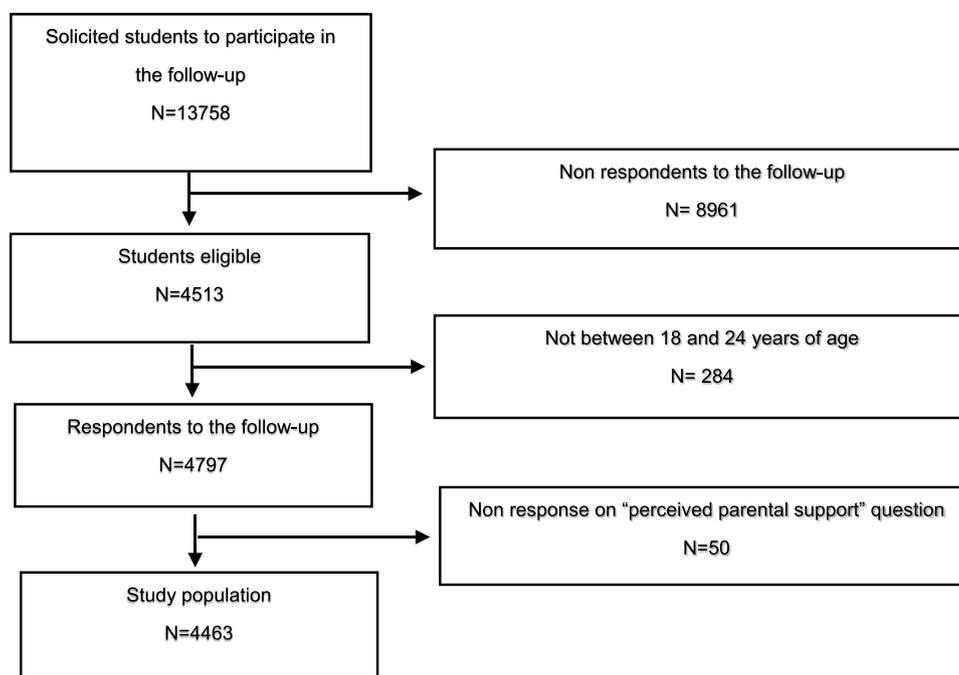


Fig. 1. Flow chart of the study sample based on the i-Share cohort (2013–2018).

4. Discussion

4.1. Main findings

In this large longitudinal study of 4463 college students, a perceived lack of parental support during childhood or adolescence was associated with a nearly 4-fold risk (aOR 3.80, CI 2.81-5.13) of major mental health disorders. Lower levels of perceived parental support were dose-dependently associated with suicidal behavior, major depression, and severe generalized anxiety disorder. Compared to participants who perceived extremely strong parental support, a total lack of perceived parental support was associated with a 2-fold greater risk of

suicidal behavior (aOR 2.67, CI 1.92–3.69), a nearly 4-fold higher risk of generalized anxiety disorder (aOR 3.96, CI 2.88–5.44), and an over 7-fold greater risk of major depression (aOR 7.43, CI 5.25–10.53). Sensitivity analysis provided consistent results. Importantly, insufficient perceived parental support was associated with higher risks than other indicators of childhood adversity, such as parental divorce. These findings highlight the relatively strong association between mental health problems and retrospective self-reported parental support compared to objective indicators of childhood adversity.

Table 1

Characteristics of the study sample overall, according to the presence of any mental health problems, and according to the three outcomes separately: suicidal behavior, major depression and severe generalized anxiety disorder. Figures are numbers (percentage) unless otherwise indicated

Characteristics	All participants	Any mental health disorders*	Suicidal behavior	Major depression	Severe generalized anxiety disorder
All	4463 (100.0)	1190 (26.7)	754 (16.9)	309 (6.9)	657 (14.7)
Age, mean (SD)	20.4 (1.8)	20.2 (1.8)	20.2 (1.8)	20.1 (1.8)	20.2 (1.8)
Sex:					
Male	888 (19.9)	175 (14.7)	140 (18.6)	32 (10.4)	63 (6.6)
Female	3575 (80.1)	1015 (85.3)	614 (81.4)	277 (89.6)	594 (90.4)
Scholarship	1734 (38.9)	501 (42.1)	309 (41.0)	140 (45.3)	280 (42.6)
Half time or more job activities	199 (4.5)	51 (4.3)	27 (3.6)	18 (5.8)	35 (5.3)
Parental education level ^a :					
University studies	2522 (57.7)	651 (55.7)	425 (57.6)	157 (52.5)	351 (54.7)
Non university studies	1853 (42.4)	517 (44.3)	314 (42.4)	142 (47.5)	291 (45.3)
Indicators of childhood adversity:					
Parental divorce or separation ^b	1294 (29.8)	389 (33.9)	247 (34.0)	106 (35.8)	206 (32.4)
Parental death ^c	186 (4.2)	59 (5.1)	44 (6.0)	14 (4.7)	29 (4.5)
Difficult economic status during childhood	353 (7.9)	129 (10.8)	85 (11.3)	48 (15.5)	77 (11.7)
Parental depression or anxiety ^d	1406 (39.2)	482 (53.0)	308 (53.9)	140 (61.1)	292 (56.6)
Parental alcohol abuse ^e	126 (3.3)	53 (5.5)	36 (6.0)	20 (8.3)	30 (5.7)
Not living in parental home during childhood ^f	94 (2.1)	35 (3.0)	25 (3.3)	12 (3.9)	20 (3.1)
Perceived parental support:					
Extremely strong	1473 (33.0)	294 (24.7)	169 (22.4)	70 (22.7)	175 (26.6)
Strong	1853 (41.5)	458 (38.5)	284 (37.7)	87 (28.2)	247 (37.6)
Moderate	807 (18.1)	290 (24.4)	199 (26.4)	88 (28.5)	149 (22.7)
Low	270 (6.1)	115 (6.7)	82 (10.8)	44 (14.2)	62 (9.4)
None	60 (1.3)	33 (2.8)	20 (2.7)	20 (6.5)	24 (3.7)

Missing: a = 88, b = 113, c = 63, d = 875, e = 631, f = 6

* Suicidal behavior, major depression or severe generalized anxiety disorder.

Table 2
Associations between perceived parental support in childhood and adolescence and one-year mental health problems*

Perceived parental support	n	Any mental health problems			Suicidal behavior			Major depressive disorder			Severe generalized anxiety disorder		
		Odds ratio (95% CI)	P value	R ²	Odds ratio (95% CI)	P value	R ²	Odds ratio (95% CI)	P value	R ²	Odds ratio (95% CI)	P value	R ²
Model 1^a													
Extremely strong	1473	1 (reference)	<.0001	0.086	1 (reference)	<.0001	0.066	1 (reference)	<.0001	0.073	1 (reference)	<.0001	0.042
Strong	1853	1.30 (1.17 to 1.43)	<.0001		1.34 (1.19 to 1.51)	<.0001		1.04 (0.86 to 1.26)	0.6662		1.16 (1.03 to 1.32)	0.0185	
Moderate	807	2.25 (2.01 to 2.52)	<.0001		2.42 (2.12 to 2.76)	<.0001		2.41 (1.97 to 2.92)	<.0001		1.73 (1.50 to 1.98)	<.0001	
Low	270	3.07 (2.63 to 3.59)	<.0001		3.27 (2.74 to 3.89)	<.0001		3.99 (3.17 to 5.03)	<.0001		2.28 (1.90 to 2.75)	<.0001	
None	60	5.14 (3.86 to 6.85)	<.0001		3.54 (2.61 to 4.81)	<.0001		10.33 (7.49 to 14.25)	<.0001		5.19 (3.87 to 6.97)	<.0001	
Model 2^b													
Extremely strong	1473	1 (reference)	<.0001	0.175	1 (reference)	<.0001	0.112	1 (reference)	<.0001	0.124	1 (reference)	<.0001	0.133
Strong	1853	1.26 (1.13 to 1.39)	0.001		1.27 (1.12 to 1.44)	0.001		1.00 (0.82 to 1.21)	0.9655		1.15 (1.00 to 1.30)	0.0394	
Moderate	807	2.00 (1.78 to 2.26)	<.0001		2.14 (1.86 to 2.46)	<.0001		2.05 (1.68 to 2.51)	<.0001		1.32 (1.31 to 1.77)	<.0001	
Low	270	2.45 (2.08 to 2.90)	<.0001		2.61 (2.18 to 3.14)	<.0001		3.03 (2.37 to 3.88)	<.0001		1.48 (1.48 to 2.21)	<.0001	
None	60	3.80 (2.81 to 5.13)	<.0001		2.67 (1.92 to 3.69)	<.0001		7.43 (5.25 to 10.53)	<.0001		3.96 (2.88 to 5.44)	<.0001	

Any mental health problems refers to having suicidal behavior, major depression or severe generalized anxiety disorder.

Suicidal behavior refers to having suicidal ideation or attempt.

Major depression refers to having moderately severe or severe depression (PHQ-9 score of 15 or higher).

Severe generalized anxiety disorder refers to having severe anxiety (GAD-7 score of 15 or higher).

* Estimations obtained after propensity weighting for non-response and multiple imputation for missing data.

^a Crude model.

^b Adjusted for age, sex, parental divorce or separation, parental death, difficult economic status in childhood, parental depression or anxiety, parental alcohol abuse and did not live in parental home in childhood and parental education level.

4.2. Comparison with the literature and interpretation

To date, few studies have examined the association between perceived parental support and mental health problems among students. Moreover, among these studies, most have not adjusted for factors related to the family environment or have been more focused on current parental support. A study of 2519 college students revealed that depression onset was predicted by a history of childhood-adolescent trauma and parental psychopathology (Ebert et al., 2019). Another study of 5183 Chinese students demonstrated that suicidal ideation was associated with improper parenting styles (Zhai et al., 2015). Moreover, studies conducted in samples with a younger age range have shown that inadequate family support increases suicide risk (Kerr et al., 2006; Miller et al., 2015). Our present results were consistent with these prior findings, and extend our previous cross-sectional analyses focused on suicidal ideation (Macalli et al., 2018).

Perceived parental support, a subjective variable, may represent an assessment of the quality of the relationship between young adults and their parents during childhood and adolescence. It does not provide information about the underpinning mechanisms. However, as shown by our present results, it is a variable highly correlated with depression, generalized anxiety, and suicidal behaviors. Perceived parental support may also reflect an aggregation of familial adversities.

Our results suggest that, regardless of the actual received parental support, a subject's perception is an important element associated with mental health disorders. Although individual responses to negative experiences during childhood can widely vary based on the exposure period and the assessment age (Zhu et al., 2019), it appears that measurement of this subjective dimension reflects a student's psychological distress and may help in identifying young people at suicide risk (Ruggeri et al., 2001; Lloyd et al., 2010; Caplan et al., 2010). Therefore, this question may be of great value in the clinical assessment of a young adult's risk of anxiety, depression, or suicidal disorders.

4.3. Strengths and limitations

Our present study had several strengths, including the large sample, longitudinal design, strong association with a dose-dependent pattern, adjustment for a large number of familial characteristic variables in multivariable models, and use of a standardized assessment scale for major depression and severe generalized anxiety disorder. Furthermore, our sensitivity analysis provided consistent results. Despite these strengths, several limitations should be considered when interpreting the results. First, the follow-up response rate was moderate (35%), as is common in longitudinal studies among young adults (Eisenberg et al., 2013; Ebert et al., 2019). To limit the impact of attrition bias, we used classical non-response propensity weighting (Austin, 2011). Second, women were over-represented in our sample, and the study sample might be not representative of the total student population. Nevertheless, for our main analyses, we tested interactions with gender and perceived parental support and found that none were significant. Third, the responses were self-reported, which could lead to an information bias, particularly if participants under-reported their frequency of mental health problems due to concerns about social acceptability. However, we assume that such under-reporting was likely reduced by the use of an on-line questionnaire. Fourth, retrospective reports of perceived parental support may entail recall bias (Baldwin et al., 2019; Widom, 2019). However, as explained above, our aim was only to investigate a potential screening tool and not to examine a causal relation between effective parental support during childhood and mental health problems among young adults. Fifth, our study did not include an exhaustive range of indicators of childhood adversity. Sixth, PHQ-9 and GAD-7 were not recorded at inclusion; therefore, we could not consider these scores in sensitivity analyses adjusted for baseline characteristics. Again, our objective was not to demonstrate causality but rather to identify a long-term marker of mental health disorders among students

Table 3
Associations between childhood adversities and one-year mental health problems*

Characteristics	n	Any mental health problems			Suicidal behavior			Major depressive disorder			Severe generalized anxiety disorder		
		Odds ratio (95% CI)	P value	R ²	Odds ratio (95% CI)	P value	R ²	Odds ratio (95% CI)	P value	R ²	Odds ratio (95% CI)	P value	R ²
Model 1^a													
Parental divorce or separation	1294	1.33 (1.23 to 1.45)	<.0001	0.010	1.26 (1.15 to 1.40)	<.0001	0.006	1.41 (1.20 to 1.65)	<.0001	0.006	1.18 (1.06 to 1.32)	<.0001	0.006
Parental death	186	1.46 (1.22 to 1.74)	<.0001	0.038	1.69 (1.39 to 2.05)	<.0001	0.005	1.20 (0.88 to 1.63)	<.0001	0.003	1.24 (0.98 to 1.55)	<.0001	0.003
Difficult economic status in childhood	353	1.68 (1.48 to 1.90)	<.0001	0.013	1.55 (1.34 to 1.79)	<.0001	0.007	2.33 (1.95 to 2.80)	<.0001	0.016	1.77 (1.53 to 2.05)	<.0001	0.016
Parental depression or anxiety	1406	2.22 (2.01 to 2.45)	<.0001	0.086	2.06 (1.78 to 2.38)	<.0001	0.052	2.61 (2.14 to 3.19)	<.0001	0.046	2.32 (2.01 to 2.68)	<.0001	0.046
Parental alcohol abuse	126	2.57 (1.91 to 3.46)	<.0001	0.020	2.50 (1.93 to 3.25)	<.0001	0.020	3.12 (2.24 to 4.32)	<.0001	0.011	2.41 (1.70 to 3.40)	<.0001	0.011
Did not live in parental home in childhood	94	1.70 (1.33 to 2.18)	<.0001	0.003	1.81 (1.38 to 2.37)	<.0001	0.004	1.97 (1.38 to 2.80)	0.0002	0.002	1.69 (1.27 to 2.26)	0.0002	0.002
Model 2^b													
Parental divorce or separation	1294	0.93 (0.84 to 1.03)	0.1481	0.175	0.89 (0.80 to 1.01)	0.0627	0.112	0.84 (0.69 to 1.02)	0.0861	0.124	0.79 (0.69 to 0.91)	0.0861	0.124
Parental death	186	1.10 (0.92 to 1.34)	0.2779		1.32 (1.07 to 1.63)	0.0106		0.81 (0.58 to 1.14)	0.2379		0.92 (0.72 to 1.17)	0.2379	
Difficult economic status in childhood	353	1.21 (1.04 to 1.40)	0.0165		1.14 (0.97 to 1.33)	0.1169		1.46 (1.19 to 1.80)	0.004		1.33 (1.12 to 1.57)	0.004	
Parental depression or anxiety	1406	1.91 (1.69 to 2.16)	<.0001		1.77 (1.50 to 2.11)	<.0001		2.09 (1.62 to 2.70)	<.0001		2.09 (1.76 to 2.47)	<.0001	
Parental alcohol abuse	126	1.54 (1.14 to 2.10)	0.0104		1.54 (1.14 to 2.10)	0.0104		1.61 (1.06 to 1.80)	0.0381		1.49 (1.00 to 2.23)	0.0381	
Did not live in parental home in childhood	94	1.49 (1.05 to 2.11)	0.0371		1.26 (0.95 to 1.70)	0.1094		1.21 (0.81 to 2.45)	0.3511		1.27 (0.92 to 1.74)	0.3511	

Any mental health problems refers to having suicidal behavior, major depression or severe generalized anxiety disorder.

Suicidal behavior refers to having suicidal ideation or attempt.

Major depression refers to having moderately severe or severe depression (PHQ-9 score of 15 or higher).

Severe generalized anxiety disorder refers to having severe anxiety (GAD-7 score of 15 or higher).

* Estimations obtained after propensity weighting for non-response and multiple imputation for missing data.

^a Crude model.

^b Adjusted for age, sex, parental divorce or separation, parental death, difficult economic status in childhood, parental depression or anxiety, parental alcohol abuse and did not live in parental home in childhood and parental education level.

when the exposure variable and mental health outcomes are assessed at different times.

4.4. Implications for clinical practice and future research

Future studies should examine the extent to which low perceived parental support correlates with current psychological distress and help-seeking behaviors. If found to be a relevant indicator, perceived parental support may represent a brief and non-intrusive screening question that can assist in identifying youths in need of psychological support. Based on its strong association with the main internalized symptoms among students, perceived parental support should be more widely used in the assessment of young adults' mental health. Although our present results require confirmation in similar settings, it appears that perceived parental support could be a potent marker of psychiatric risk, and may be very useful since it is relatively non-intrusive and well-accepted by young adults. As screening tools for the young adult population are crucially lacking, the next steps are to explore its value for predicting mental problems in the student population.

5. Conclusion

The present results strongly suggest that perceived parental support during childhood and adolescence is a potent marker of future mental health problems among students. If these findings are confirmed in other studies, perceived parental support during childhood and adolescence should be considered as a screening tool.

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CRedit authorship contribution statement

Mélissa Macalli: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing. **Sylvana Côté:** Methodology, Supervision, Validation, Writing - review & editing. **Christophe Tzourio:** Funding acquisition, Conceptualization, Methodology, Supervision, Validation, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

All other authors declare that they have no conflicts of interest.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jad.2020.02.009](https://doi.org/10.1016/j.jad.2020.02.009).

References

- Auerbach, R.P., Alonso, J., Axinn, W.G., Cuijpers, P., Ebert, D.D., Green, J.G., Hwang, I., Kessler, R.C., Liu, H., Mortier, P., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L.H., Benjet, C., Caldas-de-Almeida, J.M., Demyttenaere, K., Florescu, S., Girolamo, G., Gureje, O., Haro, J.M., Karam, E.G., Kiejna, A., Kovess-Masfety, V., Lee, S., McGrath, J.J., O'Neill, S., Pennell, B.E., Scott, K., Ten Have, M., Torres, Y., Zaslavsky, A.M., Zarkov, Z., Bruffaerts, R., 2016. Mental disorders among college students in the World Health Organization World Mental Health Surveys. *Psychol. Med.* 46, 2955–2970. <https://doi.org/10.1017/S0033291717001039>.
- Auerbach, R.P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Green, J.G., Hasking, P., Lee, S., Lochner, C., McLafferty, M., Nock, M.K., Petukhova, M.V., Pinder-Amaker, S., Rosellini, A.J., Sampson, N.A., Vilagut, G., Zaslavsky, A.M., Kessler, R.C., 2019. Mental disorder comorbidity and suicidal thoughts and behaviors in the World Health Organization World Mental Health Surveys International College Student initiative. *Int. J. Methods Psychiatr. Res.* 28, e1752. <https://doi.org/10.1002/mpr.1752>.
- Auerbach, R.P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Green, J.G., Hasking, P., Murray, E., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Stein, D.J., Vilagut, G., Zaslavsky, A.M., Kessler, R.C., Collaborators, W.H.O.W.M.H.-I.C.S., 2018. WHO World Mental Health Surveys International College Student Project: prevalence and distribution of mental disorders. *J. Abnorm. Psychol.* 127, 623–638. <https://doi.org/10.1037/abn0000362>.
- Austin, P.C., 2011. An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behav. Res.* 46, 399–424. <https://doi.org/10.1080/00273171.2011.568786>.
- Bagner, D.M., Graziano, P.A., 2013. Barriers to success in parent training for young children with developmental delay: the role of cumulative risk. *Behav. Modif.* 37, 356–377. <https://doi.org/10.1177/0145445512465307>.
- Baldwin, J.R., Reuben, A., Newbury, J.B., Danese, A., 2019. Agreement between prospective and retrospective measures of childhood maltreatment: a systematic review and meta-analysis. *JAMA Psychiatry* 76, 584–593. <https://doi.org/10.1001/jamapsychiatry.2019.0097>.
- Björkenstam, C., Kosidou, K., Björkenstam, E., 2017. Childhood adversity and risk of suicide: cohort study of 548 721 adolescents and young adults in Sweden. *BMJ* 357, j1334. <https://doi.org/10.1136/bmj.j1334>.
- Blanco, C., Okuda, M., Wright, C., Hasin, D.S., Grant, B.F., Liu, S.M., Olsson, M., 2008. Mental health of college students and their non-college-attending peers: results from the national epidemiologic study on alcohol and related conditions. *Arch. Gen. Psychiatry* 65, 1429–1437. <https://doi.org/10.1001/archpsyc.65.12.1429>.
- Bruffaerts, R., Mortier, P., Auerbach, R.P., Alonso, J., De la Torre, A.E., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Green, J.G., Hasking, P., Stein, D.J., Ennis, E., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Vilagut, G., Zaslavsky, A.M., Kessler, R.C., 2019. Lifetime and 12-month treatment for mental disorders and suicidal thoughts and behaviors among first year college students. *Int. J. Methods Psychiatr. Res.* 28, e1764. <https://doi.org/10.1002/mpr.1764>.
- Bruwer, B., Govender, R., Bishop, M., Williams, D.R., Stein, D.J., Seedat, S., 2014. Association between childhood adversities and long-term suicidality among South Africans from the results of the South African Stress and Health study: a cross-sectional study. *BMJ Open* 4, e004644. <https://doi.org/10.1136/bmjopen-2013-004644>.
- Caplan, S., Alvidrez, J., Paris, M., Escobar, J.I., Dixon, J.K., Desai, M.M., Whittemore, R., Scahill, L.D., 2010. Subjective versus objective: an exploratory analysis of latino primary care patients with self-perceived depression who do not fulfill primary care evaluation of mental disorders patient health questionnaire criteria for depression. *Prim Care Companion J. Clin. Psychiatry.* 12. <https://doi.org/10.4088/PC.09m00899blu>.
- Duffy, A., Saunders, K.E.A., Malhi, G.S., Patten, S., Cipriani, A., McNeven, S.H., MacDonald, E., Geddes, J., 2019. Mental health care for university students: a way forward? *Lancet Psychiatry.* [https://doi.org/10.1016/S2215-0366\(19\)30275-5](https://doi.org/10.1016/S2215-0366(19)30275-5).
- Easterlin, M.C., Chung, P.J., Leng, M., Dudovitz, R., 2019. Association of team sports participation with long-term mental health outcomes among individuals exposed to adverse childhood experiences. *JAMA Pediatr.* 173, 681–688. <https://doi.org/10.1001/jamapediatrics.2019.1212>.
- Ebert, D.D., Buntrock, C., Mortier, P., Auerbach, R., Weisel, K.K., Kessler, R.C., Cuijpers, P., Green, J.G., Kiekens, G., Nock, M.K., Demyttenaere, K., Bruffaerts, R., 2019. Prediction of major depressive disorder onset in college students. *Depress. Anxiety* 36, 294–304. <https://doi.org/10.1002/da.22867>.
- Eisenberg, D., Gollust, S.E., Golberstein, E., Hefner, J.L., 2007. Prevalence and correlates of depression, anxiety, and suicidality among university students. *Am. J. Orthopsychiatry* 77, 534–542. <https://doi.org/10.1037/0002-9432.77.4.534>.
- Eisenberg, D., Hunt, J., Speer, N., 2013. Mental health in American colleges and universities: variation across student subgroups and across campuses. *J. Nerv. Ment. Dis.* 201, 60–67. <https://doi.org/10.1097/NMD.0b013e31827ab077>.
- Falissard, B., Barry, C., Hassler, C., Letrait, M., Macher, G., Marty, F., Ramos, E., Revah-Lévy, A., Robert, P., De Singly, F., 2015. When assessing intra-familial relationships, are sociologists, psychoanalysts and psychiatrists really considering different constructs? An empirical study. *PLoS One* 10, e0132153. <https://doi.org/10.1371/>

- journal.pone.0132153.
- Faris, P.D., Ghali, W.A., Brant, R., Norris, C.M., Galbraith, P.D., Knudtson, M.L., Approach Investigators. Alberta Provincial Program for Outcome Assessment in Coronary Heart Disease, 2002. Multiple imputation versus data enhancement for dealing with missing data in observational health care outcome analyses. *J. Clin. Epidemiol.* 55, 184–191. [https://doi.org/10.1016/s0895-4356\(01\)00433-4](https://doi.org/10.1016/s0895-4356(01)00433-4).
- Garlow, S.J., Rosenberg, J., Moore, J.D., Haas, A.P., Koestner, B., Hendin, H., Nemeroff, C.B., 2008. Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depress Anxiety* 25, 482–488. <https://doi.org/10.1002/da.20321>.
- Gilbert, R., Widom, C.S., Browne, K., Fergusson, D., Webb, E., Janson, S., 2009. Burden and consequences of child maltreatment in high-income countries. *Lancet* 373, 68–81. [https://doi.org/10.1016/S0140-6736\(08\)61706-7](https://doi.org/10.1016/S0140-6736(08)61706-7).
- Green, J.G., McLaughlin, K.A., Berglund, P.A., Gruber, M.J., Sampson, N.A., Zaslavsky, A.M., Kessler, R.C., 2010. Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication I: associations with first onset of DSM-IV disorders. *Arch. Gen. Psychiatry* 67, 113–123. <https://doi.org/10.1001/archgenpsychiatry.2009.186>.
- Guldin, M.B., Li, J., Pedersen, H.S., Obel, C., Agerbo, E., Gissler, M., Cnattingius, S., Olsen, J., Vestergaard, M., 2015. Incidence of suicide among persons who had a parent who died during their childhood: a population-based cohort study. *JAMA Psychiatry* 72, 1227–1234. <https://doi.org/10.1001/jamapsychiatry.2015.2094>.
- Hughes, K., Bellis, M.A., Sethi, D., Andrew, R., Yon, Y., Wood, S., Ford, K., Baban, A., Boderscova, L., Kachaeva, M., Makaruk, K., Markovic, M., Povilaitis, R., Raleva, M., Terzic, N., Veleminsky, M., Włodarczyk, J., Zakhozha, V., 2019. Adverse childhood experiences, childhood relationships and associated substance use and mental health in young Europeans. *Eur. J. Public Health* 29, 741–747. <https://doi.org/10.1093/eurpub/ckz037>.
- Janssen, K.J.M., Donders, A.R.T., Harrell, F.E., Vergouwe, Y., Chen, Q., Grobbee, D.E., Moons, K.G.M., 2010. Missing covariate data in medical research: to impute is better than to ignore. *J. Clin. Epidemiol.* 63, 721–727. <https://doi.org/10.1016/j.jclinepi.2009.12.008>.
- Kerr, D.C.R., Preuss, L.J., King, C.A., 2006. Suicidal adolescents' social support from family and peers: gender-specific associations with psychopathology. *J. Abnorm. Child Psychol.* 34 (1), 103–114. <https://doi.org/10.1007/s10802-005-9005-8>.
- Kessler, R.C., McLaughlin, K.A., Green, J.G., Gruber, M.J., Sampson, N.A., Zaslavsky, A.M., Aguilar-Gaxiola, S., Alhamzawi, A.O., Alonso, J., Angermeyer, M., Benjet, C., Bromet, E., Chatterji, S., De Girolamo, G., Demeyttenaere, K., Fayyad, J., Florescu, S., Gal, G., Gureje, O., Haro, J.M., Hu, C., Karam, E.G., Kawakami, N., Lee, S., Lépine, J.P., Ormel, J., Posada-Villa, J., Sagar, R., Tsang, A., Üstün, T.B., Vassilev, S., Viana, M.C., Williams, D.R., 2010. Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *Br. J. Psychiatry* 197, 378–385. <https://doi.org/10.1192/bjp.bp.110.080499>.
- King, C.A., Kerr, D.C.R., Passarelli, M.N., Foster, C.E., Merchant, C.R., 2010. One-year follow-up of suicidal adolescents: parental history of mental health problems and time to post-hospitalization attempt. *Youth Adoles.* 39, 219–232. <https://doi.org/10.1007/s10964-009-9480-2>.
- Kroenke, K., Spitzer, R.L., Williams, J.B., 2001. PHQ-9: validity of a brief depression severity measure. *J. Gen. Intern. Med.* 16, 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>.
- Levin, K.A., Currie, C., 2010. Family structure, mother-child communication, father-child communication, and adolescent life satisfaction. *Health Educ.* 110 (3). <https://doi.org/10.1108/09654281011038831>.
- Lindström, M., Rosvall, M., 2015. Parental separation in childhood, social capital, and suicide thoughts and suicide attempts: a population-based study. *Psychiatry Res.* 229, 206–213. <https://doi.org/10.1016/j.psychres.2015.07.034>.
- Lloyd, C., King, R., Moore, L., 2010. Subjective and objective indicators of recovery in severe mental illness: a cross-sectional study. *Int. J. Soc. Psychiatry* 56, 220–229. <https://doi.org/10.1177/0020764009105703>.
- Lovejoy, M.C., Graczyk, P.A., O'Hare, E., Neuman, G., 2000. Maternal depression and parenting behavior: a meta-analytic review. *Clin. Psychol. Rev.* 20, 561–592. [https://doi.org/10.1016/S0272-7358\(98\)00100-7](https://doi.org/10.1016/S0272-7358(98)00100-7).
- Macalli, M., Tournier, M., Galéra, C., Montagni, I., Soumare, A., Côté, S.M., Tzourio, C., 2018. Perceived parental support in childhood and adolescence and suicidal ideation in young adults: a cross-sectional analysis of the i-Share study. *BMC Psychiatry* 18, 373. <https://doi.org/10.1186/s12888-018-1957-7>.
- Miller, A.B., Esposito-Smythers, C., Leichtweis, R.N., 2015. Role of social support in adolescent suicidal ideation and suicide attempts. *J. Adolesc. Health* 56 (3), 286–292. <https://doi.org/10.1016/j.jadohealth.2014.10.265>.
- Moore, S.A., Widales-Benitez, O., Carnazzo, K.W., Kim, E.K., Moffa, K., Dowdy, E., 2015. Conducting universal complete mental health screening via student self-report. *Contemp. School Psychol.* 19, 253–267. <https://doi.org/10.1007/s40688-015-0062-x>.
- Rosenbaum, P.R., Rubin, D.B., 1983. The central role of the propensity score in observational studies of causal effects. *Biometrika* 70, 41–55. <https://doi.org/10.1146/annurev.publhealth.21.1.121>.
- Ruggeri, M., Bisoffi, G., Fontecedro, L., Warner, R., 2001. Subjective and objective dimensions of quality of life in psychiatric patients: a factor analytical approach: the South Verona Outcome Project 4. *Br. J. Psychiatry* 178, 268–275. <https://doi.org/10.1192/bjp.178.3.268>.
- Schaan, V.K., Schulz, A., Schächinger, H., Vögele, C., 2019. Parental divorce is associated with an increased risk to develop mental disorders in women. *J. Affect. Disord.* 257, 91–99. <https://doi.org/10.1016/j.jad.2019.06.071>.
- Shan, W., Zhang, Y., Zhao, J., Zhang, Y., Cheung, E.F.C., Chan, R.C.K., Jiang, F., 2019. Association between maltreatment, positive parent-child interaction, and psychosocial well-being in young children. *J. Pediatr.* <https://doi.org/10.1016/j.jpeds.2019.06.050>.
- Simpson-Adkins, G.J., Daiches, A., 2018. How do children make sense of their parent's mental health difficulties: a meta-synthesis. *J. Child Fam. Stud.* 27, 2705. <https://doi.org/10.1007/s10826-018-1112-6>.
- Spitzer, R.L., Kroenke, K., Williams, J.B.W., Löwe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch. Intern. Med.* 166, 1092–1097. <https://doi.org/10.1001/archinte.166.10.1092>.
- Taraban, L., Shaw, D.S., Leve, L.D., Wilson, M.N., Dishion, T.J., Natsuaki, M.N., Neiderhiser, J.M., Reiss, D., 2017. Maternal depression and parenting in early childhood: contextual influence of marital quality and social support in two samples. *Dev. Psychol.* 53, 436–449. <https://doi.org/10.1037/dev0000261>.
- Turecki, G., Brent, D.A., 2016. Suicide and suicidal behaviour. *Lancet* 387, 1227–1239. [https://doi.org/10.1016/S0140-6736\(15\)00234-2](https://doi.org/10.1016/S0140-6736(15)00234-2).
- Van Buuren, S., 2007. Multiple imputation of discrete and continuous data by fully conditional specification. *Stat. Methods Med. Res.* 16, 219–242. <https://doi.org/10.1177/0962280206074463>.
- Weist, M.D., Rubin, M., Moore, E., Adelsheim, S., Wrobel, G., 2007. Mental health screening in schools. *J. Sch. Health* 77, 53–58. <https://doi.org/10.1111/j.1746-1561.2007.00167.x>.
- Widom, C.S., 2019. Are Retrospective self-reports accurate representations or existential recollections? *JAMA Psychiatry* 76, 567–568. <https://doi.org/10.1001/jamapsychiatry.2018.4599>.
- Wilcox, H.C., Arria, A.M., Caldeira, K.M., Vincent, K.B., Pinchevsky, G.M., O'Grady, K.E., 2010. Prevalence and predictors of persistent suicide ideation, plans, and attempts during college. *J. Affect. Disord.* 127, 287–294. <https://doi.org/10.1016/j.jad.2010.04.017>.
- Wilson, S., Durbin, C.E., 2010. Effects of paternal depression on fathers' parenting behaviors: a meta-analytic review. *Clin. Psychol. Rev.* 30, 167–180. <https://doi.org/10.1016/j.cpr.2009.10.007>.
- World Health Organization, 2013. Young people and health: challenge for society. http://whqlibdoc.who.int/trs/WHO_TRS_731_fre.pdf (accessed 06 June 2019).
- Zhai, H., Bai, B., Chen, L., Han, D., Wang, L., Qiao, Z., Qiu, X., Yang, X., Yang, Y., 2015. Correlation between family environment and suicidal ideation in university students in China. *Int. J. Environ. Res. Public Health* 12 (2), 1412–1424. <https://doi.org/10.3390/ijerph120201412>.
- Zhu, J., Lowen, S.B., Anderson, C.M., Ohashi, K., Khan, A., Teicher, M.H., 2019. Association of prepubertal and postpubertal exposure to childhood maltreatment with adult amygdala function. *JAMA Psychiatry*. <https://doi.org/10.1001/jamapsychiatry.2019.0931>.