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**How to cite**

BINDER, Philippe et al. Detection of adolescent suicidality in primary care: an international utility study of the bullying-insomnia-tobacco-stress test. In: Early Intervention in Psychiatry, 2019. doi: 10.1111/eip.12828

This publication URL: https://archive-ouverte.unige.ch/unige:118112
Publication DOI: 10.1111/eip.12828

Received: 20 November 2018 | Revised: 30 January 2019 | Accepted: 14 April 2019

DOI: 10.1111/eip.12828

ORIGINAL ARTICLE

WILEY

# Detection of adolescent suicidality in primary care: an international utility study of the bullying-insomnia-tobacco-stress test

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## Abstract

**Aim:** General practitioners (GPs) are ideally placed to identify suicidality in adolescents. However, adolescents are often reluctant to confide in their GPs about these problems, and GPs are not comfortable when questioning them about suicide. We previously proposed the BITS test, a set of four opening and four additional questions, to alert doctors about possible suicidality in an adolescent. We validated its use in the identification of suicidality ("frequent suicidal ideation or suicide attempts at one time or another)" in 15-year-old adolescents in a school setting. The objective of the present study was to assess the detection utility of this method in 13-to-18-year-olds in primary care.

**Methods:** We carried out a screening utility study in general practices in 17 French-speaking sites in four countries and three continents. Each GP was instructed to use the bullying, insomnia, tobacco, stress (BITS) test with five to ten 13-to-18-year-old adolescents, consulting consecutively, for any reason. They subsequently asked them questions about their suicidality.

**Results:** One hundred and two GPs tested a total of 693 adolescents; 13.0% of the adolescents (girls 15.4%, boys 9.9%) reported suicidality (1.6% known, 11.4% previously unknown). A score of at least 3 on the BITS scale was associated with suicidality (sensitivity: 65.9, specificity: 82.5%).

**Conclusions:** The BITS test is a pragmatic instrument, alerting the GP to an adolescent's previously unknown suicidability, whatever the reason for consultation.

KEYWORDS

adolescent, general practice, mass screening, primary health care, suicide attempt

## 1 | INTRODUCTION

Adolescent suicide is a major cause of mortality in children in high-income countries (Hawton, Saunders, & O'Connor, 2012). Individuals having experienced suicidal ideation (SI) or suicide attempts (SA) in adolescence have poorer mental, physical and social outcomes and are more likely than others to engage in violence in adulthood (Goldman-Mellor et al., 2014). Recent ideation and previous attempts are strongly associated with future attempts (Czyz & King, 2015; Horwitz, Czyz, & King, 2015). Early detection appears to reduce

subsequent morbidity and mortality in young people and presents no additional risk (Gould et al., 2009; Hawton et al., 2012; Williams, O'Connor, Eder, & Whitlock, 2009).

Since most adolescents consult them at least once a year, general practitioners (GPs) are ideally placed to identify suicidal adolescents (Beck & Richard, 2010; Mauerhofer, Berchtold, Michaud, & Suris, 2009; Zwaanswijk, Verhaak, van der Ende, Bensing, & Verhulst, 2005). Moreover, GPs have been requested to do so, and reduced suicide rates have been reported among adult patients of GPs trained to screen for SI or tendencies (Mann et al., 2005; Szanto, Kalmar, Hendin, Rihmer, & Mann, 2007). However, it has been difficult to prove the effectiveness of such detection among adolescents (HAS-Haute Autorité de Santé, 2014; LeFevre & U. S. Preventive Services Task Force, 2014; Stene-Larsen & Reneflot, 2017; Taliaferro, Oberstar, & Borowsky, 2012). Indeed, detection is problematic. Adolescents do not spontaneously broach the subject with their GP; (Taliaferro et al., 2012) when they confide, it is in their friends or parents (Tudrej, Heintz, Ingrand, Gicquel, & Binder, 2016). In addition, GPs are not inclined to spontaneously screen for suicidal behaviour in adolescents (Binder & Chabaud, 2007a). They are reluctant to question them about SI and SA, particularly when the reasons for consultation are somatic or administrative, as is the case in more than 92% of visits (Feldman et al., 2007; Frankenfield et al., 2000; Tudrej et al., 2017). They claim to have neither the necessary time nor the requisite skills. They claim to have neither the necessary time nor the requisite skills, and they also mention poor service availability (Leahy et al., 2018; O'Brien, Harvey, Howse, Reardon, & Creswell, 2016).

Although many instruments have been proposed to screen for suicidal risk, none are truly suited for use with adolescents in primary care (O'Connor, Gaynes, Burda, Williams, & Whitlock, 2013). More often than not, the detection tools consist in lengthy questionnaires that are not suitable for primary care (O'Connor et al., 2013; Perlman, Neufeld, Martin, Goy, & Hirdes, 2011; Shain & Committee On Adolescence, 2016). GPs are frequently averse to the use of questionnaires, whether they be paper-based or online (Cario, Levesque, & Bouche, 2010). As a result, GPs are unaware of the SI and SA histories of most of the adolescents they examine on a daily basis and are therefore oblivious to these threats to their patients' mental health. Some authors have recommended direct formulation of the question: "Have you ever thought about killing yourself..?" (Shain & Committee On Adolescence, 2016). Yet outside a research context, GPs are unlikely to ask such a question if the adolescent is consulting for a somatic or administrative reason and is not overtly depressed (Binder & Chabaud, 2007a; O'Brien et al., 2016). Prior to venturing to do so, a GP stands in need of warning signals. This is why we propose to proceed as unobtrusively as possible by asking simple, indirect questions, to which the aggregated responses could alert to possible SI or SA, and impel GPs to ask about hitherto unknown suicidality (Binder & Chabaud, 2007b).

With this in mind, we developed and validated the "TSTScafard." It consists in five opening questions, which lead in the event of a positive response to five additional questions regarding severity. A score equal or superior to three points will alert and prompt the GP to ask questions about unexpressed suicidality (Binder & Chabaud, 2007b). A clinical audit in general medicine underscored a highly significant difference between current practice and use of the test as means of revealing previously unknown suicidality (Binder & Chabaud, 2007a). The TSTScafard was validated in France and its use has been recommended by the national health authority (HAS-Haute Autorité de Santé, 2014).

That much said, the test is based on data collected in 1999; since that time, behavioural changes in adolescents have been associated with the influence of Internet and social networks (Marchant et al., 2017). Moreover, TSTScafard memorization stood in need of improvement; we consequently proceeded to its updating and simplification by elaborating the BITS test (Binder & Chabaud, 2007b), which is limited to 4 questions with 2 levels of severity in the responses (Figure 1). To develop the BITS test, we reviewed the literature in order to identify adolescent behaviours known to be associated with suicidality (Binder et al., 2018). We then conducted a school-based study involving 15-year-old students, and four of these behaviours were shown to be both highly associated with suicidality and easy to discuss with adolescents: Bullying (van Geel, Vedder, & Tanilon, 2014), Insomnia (McCall et al., 2013), Tobacco (Riala, Taanila, Hakko, & Rasanen, 2009) and Stress (Stanley et al., 2013). Questions about these behaviours were combined to form the BITS test. This test includes questions for each of these behaviours, each of them with two levels of severity. The school-based study showed that providing three or more positive answers to these questions was associated with a higher prevalence of reporting a recent and/or past history of suicidality.

Our primary objective in the present study was to determine whether this association was verifiable among 13-to-18-year-olds examined in primary care, whatever their reasons for consultation, and also to determine whether the aforementioned score of

**The BITS test** .

The test consists in asking four initial questions to teenagers consulting in general practice ; when a response is positive (=1point), the additional question indicating degree of severity is put forward (= 2 points if positive). Only the maximum score is taken into account. A score of 3 alerts the physician to a risk of previous suicidality. The following sequence is the one we would recommend in the clinical setting. The following order is most often accepted in consultation:

- Do you often have Insomnia, sleep disturbances? (1pt)… nightmares? (2pt)
- Do you feel Stressed by schoolwork or by your family environment? (1pt)… by both? (2pt),
- Have you recently been Bullied or mistreated in school, possibly by telephone or the Internet? (1pt) … or outside of school? (2pt)
- Do you sometimes smoke Tobacco? (1pt) … every day? (2pt)

**FIGURE 1** The BITS test

3 remained valid. Our secondary objective was to measure the degree of suicidality hitherto unknown to GPs in this population.

## 2 | METHODS

### 2.1 | Study design and participants

To answer this question we chose to design a study in a primary care setting involving adolescents consulting a territorially diversified sample of GPs. The study was conducted in 17 French-speaking sites on 3 continents: 11 in metropolitan France, 2 in overseas France (La Réunion, Martinique) and in 3 other countries (Switzerland, Luxembourg, Belgium). At each site, a local co-investigator recruited a convenience sample of 3 to 10 GPs. He/she met them either individually or in groups to provide them with detailed instructions about the study procedure. Each participating GP had to include five to ten consecutive 13-to-18-year-old patients regardless of their reason for consultation. Following five observations applying the BITS, the GPs were awarded 100 euros.

As in international epidemiological references, the chosen age range was 13-18 years (YRBS, n.d.). Exclusion criteria were: any psychiatric disorders precluding the ability to consent or to respond in an appropriate way (eg, acute psychotic episode), an emergency necessitating immediate transfer, and refusal of the adolescent (or his/her legal representative) to participate.

### 2.2 | Test methods

The adolescents and their parents were informed by a poster in the waiting room about an ongoing study on teenage health; as a general rule, no mention was made of suicidality. They signed an agreement to participate and kept the original document. When a minor attended the practice alone, a copy of the agreement was sent to a parent, who could refuse utilization of the data (except in Switzerland, where mature minors could consent to participation without a parent's involvement).

The GP was asked to complete a paper-based questionnaire at the end of the consultation for each 13-to-18-year-old patient who met the inclusion criteria, without exception. The procedure to be followed was:

1 -The GP him or herself, not a secretary or a practice assistant, was to apply the BITS test. The test consists in asking four initial questions to teenagers consulting in general practice; when a response is positive (=1point), the additional question concerning degree of severity is put forward. (=2 points if positive) Only the maximum score is taken into account. A score of 3 alerts the physician to a risk of suicide.

2- Only afterwards was the GP asked to enquire about possible suicidality with two questions: "Have you often thought about suicide over the last 12 months?" and "Have you tried to commit suicide at least once in your life?". 3—The GP was then asked to review different aspects of the overall context: Had he/she managed to ask the questions? If not, why? If he/she had done so, he noted down the responses and indicated whether the questions had been put forward in the presence of a third party. After this, the GP provided details about the patient: age and gender. Whether the patient came accompanied, whether they knew the patient before and had knowledge of any previous suicidality, the reason for the consultation, whether they referred the patient (to a specialist) if suicidality was identified, whether they widened the scope of the consultation beyond its original purpose.

### 2.3 | Ethic

The study protocol was registered on October 17, 2016 by the French national commission for data protection and liberties (CNIL) as n°1995986v0 without occasioning any negative remarks. On November 7, 2016 the committee for protection of persons (CPP Ouest III) delivered a favourable opinion (n°16.07.34). For Switzerland, approval was given by the cantonal research and ethics commission of Geneva (n° 2017-00140), for Belgium, by the ethics commission of Liège University (n°2016/361) and for Luxemburg by the National Research Ethics Committee (CNER) (n°201609/06).

### 2.4 | Analysis

Since these were not independent observations, the different adolescents examined by a single GP formed a cluster. Initial sample size was calculated using an estimation approach based on individual sampling, and was subsequently increased according to a variance inflation factor, taking intra-cluster correlation into account. The primary endpoint was the proportion of suicidality revealed using the BITS test (suicidality: at least one suicidal attempt during lifetime or any SI over the past 12 months). The parameters were: bilateral alpha risk 5%; primary endpoint frequency of 3% to 5% of suicidality discovered by the TSTScafard (Binder et al., 2018) intraclass correlation coefficient 0.05 corresponding to a variance inflation factor of 1.2 for a population of five adolescents/GP cluster. Minimum sample size was 460 adolescents and 100 GPs. *P*-value <.05 was considered as statistically significant. Estimates with 95% confidence intervals (95% CI) were applied in a version suited to cluster sampling, taking into account possible non-independence of the observations put forward by the same GP. Data capture was carried out by two different operators and followed by comparison of the files. SAS software (version 9.4) was used.

## 3 | RESULTS

One hundred and eight GPs agreed to participate; 102 of them sent in their response sheets, which included 693 adolescents. There were 5 to 12 GPs per site with a sex ratio 0.94 (M/F). Five adolescents were excluded because they were under 13. Average age was 15.5 years (SD 1.6). Age distribution was: 13 years: 14.1%; 14 years: 15.7%; 15 years: 19.9%; 16 years: 20.0%; 17 years: 19.4%; 18 years: 11.0%.

The BITS test was not given to 33 adolescents: 16 for a practical reason, 6 adolescents declined participation and 11 for other reasons. All in all, 655 of the 13-to-18-year-olds (girls 55.4%) answered the BITS questions, and the implementation rate was 95.2%. The number of situations in which GPs did not use the BITS during consultations was 33 (4.8%). They occurred because of a practical problem (16:2.3%); due to psychological reluctance of the GP (6:0.9%); for other reasons (11:1.6%) including: 3 oversights, 2 autist patients, 1 refusal, 1 "lack of time," 1 "over-protective mother," 1 "information previously given," 1 "not the reason for the consultation."

In 81.5% of the consultations, the GP previously knew the adolescent. Reasons for the office visit were: somatic: 84.4%; administrative (essentially a medical certificate for sports practice or school absence): 12.1% and psychological: 8.9%. The adolescents came alone: 32.8%; accompanied by a parent: 65.0%; accompanied by a friend: 1.8%. In 39.4% of the cases, an accompanying person was present in the consultation room when the adolescent was asked the BITS questions. The proportion of accompanying persons who remained in the waiting room was 27.4%. Declared suicidality rates are presented in Table 1.

Suicidal attempts or ideation were reported by 13.0% (n = 85) of the adolescents, 95% CI [10.1; 15.8%] with a significant gender difference: (girls: 15.4%, boys: 9.9%, $P$ = 0,038). Suicidality that was previously unknown to the GP was reported by 11.4% (n = 62; 95% CI [8.4; 14.4%]).

Responses to the BITS test are summarized in Table 2. We did not stratify this presentation by gender because, with the exception of bullying outside school, which mostly involved boys, no statistically significant gender differences were observed.

A score ≥ 3 was found in 65.9% of suicidal adolescents, and a score < 3 in 82.5% of non-suicidal adolescents ($P$ < .0001). A score ≥ 3 showed sensitivity of 65.9%, 95% CI [54.8; 75.3%] and specificity of 82.5%, 95% CI [79.1; 85.5%] for the identification of suicidality ($P$ < .0001). The area under the curve (AUC) was 0.767 (Figure 2).

## 4 | DISCUSSION

### 4.1 | Highlights

As a means of alerting about a history of suicidality, the performance of the BITS-test in a primary care population of 13-to-18-year-olds consulting a GP was similar to that of a self-administered questionnaire completed by 15-year-olds in a school setting (Binder et al., 2018). The ROC curve indicated that a score equal or above 3 on the BITS test showed good sensitivity (66%) and high specificity (83%) for the identification of suicidality in this population.

The prevalence of newly identified suicidality in this sample was relatively high (11.4%), although that of previously known suicidality was 1.6%. These results underscore the interest of this method as an instrument for detection of a history of suicidality. Given the relatively elevated morbi-mortality of adolescents, the stakes are major.

**TABLE 1** Stated suicidality rate among 655 adolescents consulting 102 family physicians, stratified by gender

| | All N = 655 n (%) | Boys N = 363 n (%) | Girls N = 292 n (%) | OR [95% CI] Girls vs Boys |
|---|---|---|---|---|
| SA[a] | 41 (6.3) | 12 (4.1) | 29 (8.0) | 2.03 [1.01-4.04] |
| SI[b] | 67 (10.2) | 22 (7.5) | 45 (12.4) | 1.74 [1.02-2.97] |
| SI or SA | 85 (13.0) | 29 (9.9) | 56 (15.4) | 1.65 [1.03-2.67] |

[a]SA: at least one suicide attempt in life.
[b]SI: suicidal ideation often over the past 12 months.

### 4.2 | Explanation

These findings confirm and even improve the results of our previous work: in the initial BITS study using a self-completed questionnaire among 15-year-old school students, sensitivity was 75% and specificity 70% (AUC = 0.78) (Binder et al., 2018). In the TSTScafard detection utility study, sensitivity was 79%, and specificity 55% (Binder et al., 2018; Binder & Chabaud, 2007b). Our data are in line with those of questionnaires investigating suicidality (even though these questionnaires are designed to assess suicide risk per se, not to alert GPs about the need to ask about suicidality). In these different studies, sensitivity ranged from 52% to 87% and specificity from 60% to 85% (O'Connor et al., 2013; Perlman et al., 2011).

The rate of stated SA (boys 4%, girls 8%) was lower than the French benchmark data collected by questionnaires in school settings: (boys 7%, girls 15.8%) (Jousselme, Cosquier, & Hassler, 2015). The odd ratios individually associating suicidality with each parameter (Bullying (van Geel et al., 2014), Insomnia (McCall et al., 2013), Tobacco (Riala et al., 2009) and Stress (Stanley et al., 2013)) differed from those presented in the literature. These divergent results may be explained by a data gathering context liable to alter response sincerity, namely face-to-face interview, often in the presence of an accompanying person, whereas most studies in the literature have been conducted using self-administered questionnaires in a confidential setting offering more effective safeguards. Since this context is likely to have influenced both the responses to the BITS questions and those about suicidality, our results are probably rather conservative.

However, a need to maintain ordinary medical practice conditions prevailed over any need to obtain factually accurate information on actual behaviours. As an easily usable test, the BITS responds to a demand for simple tools for use by GPs (Perlman et al., 2011). And given its non-intrusive simplicity, the bullying, insomnia, tobacco, stress (BITS) can be employed repeatedly for the same adolescent insofar as suicidal tendencies are prone to fluctuate (Hawton et al., 2012). The level of acceptance of this type of approach among GPs is high (Binder & Chabaud, 2007a).

In a synthesis, Perlman noted that "the scores generated by evaluation instruments are at times less useful than the range of subjects broached in the questions." (Perlman et al., 2011). In this respect, the BITS fulfils a useful role. It functions both as an early warning system AND as a means of opening communication without having to consult a written document. GPs can easily include it in routine questioning of any adolescent seen in primary care office visits.

**TABLE 2** Items of the BITS test according to suicidality[a] associated with its Odds Ratio (OR)

| BITS test questions | Score | n 655 | Adolescents with non-suicidality n (%) 570 (87) | Adolescents with suicidality n (%) 85 (13) | OR for suicidality P < .05 | 95% CI |
|---|---|---|---|---|---|---|
| Do you often have insomnia or sleep disturbances? | | | | | | |
| No | 0 | 432 | 399 (70) | 33 (38.8) | 1 | |
| Yes | 1 | 175 | 144 (25.3) | 31 (36.5) | 2.6 | [1.54; 4.4] |
| Nightmares: yes | 2 | 48 | 27 (4.7) | 21 (24.7) | 9.4 | [4.8; 18.4] |
| Do you often smoke? | | | | | | |
| No | 0 | 549 | 485 (85.1) | 64 (75.3) | 1 | |
| Yes | 1 | 47 | 36 (6.3) | 11 (12.9) | 2.32 | [1.12; 4.78] |
| Every day: yes | 2 | 59 | 49 (8.6) | 10 (11.8) | 1.55 | [0.75; 3.21] |
| Do you feel stressed by work or your family environment? | | | | | | |
| No | 0 | 296 | 281 (49.3) | 15 (17.6) | 1 | |
| Yes | 1 | 253 | 223 (39.1) | 30 (35.3) | 2.52 | [1.32; 4.8] |
| By both: yes | 2 | 105 | 65 (11.4) | 40 (47.1) | 11.53 | [6.01; 22.13] |
| Have you been bullied or mistreated in your school, possibly by telephone or the Internet? | | | | | | |
| No | 0 | 539 | 497 (87.2) | 42 (49.4) | 1 | |
| Yes | 1 | 92 | 59 (10.4) | 33 (38.8) | 6.62 | [3.9; 11.25] |
| Outside a school setting: yes | 2 | 24 | 14 (2.5) | 10 (11.8) | 8.45 | [3.54; 20.18] |

[a]Suicidality = at least one suicide attempt in life or suicidal ideation often over the past 12 months.

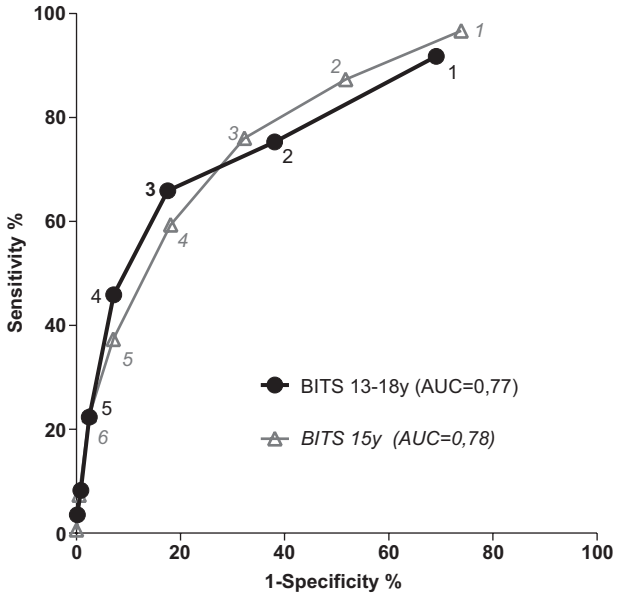


**FIGURE 2** Area under the curve (AUC) curve for different bullying, insomnia, tobacco, stress (BITS) test scores

## 4.3 | Strengths and limitations

This study has limitations. Inclusion duration was prolonged due to our having overestimated the frequency of adolescents' office visits. The participating GPs were not chosen at random, and requests for local collaborators were associated more with their availabilities than with any typology of teenage patients. As is the case in any survey of this kind, the GPs were to some extent called upon to volunteer. On the other hand, the participating adolescents were recruited consecutively. They were not filtered, and the quantity and diversity of sites increased the external validity of the study. Moreover, the proportion of psychological reasons for consultation (8.9%) was similar to the stable proportion (8%) found in other studies (Meynard, Broers, Lefebvre, Narring, & Haller, 2015; Tudrej et al., 2017), thus adding value to our recruitment method.

Usual practice was modified by the conditions set by existing ethical requirements: A poster appeared in the waiting room, consent was signed and the paper questionnaire was filled out by hand. The study conditions thereby differed from those recommended for the BITS test, that is, that the questions should be introduced in a low-key, non-intrusive manner. The presence of a third party may possibly have impeded the adolescents' responses and even reduced the number of positive ones. That said, wishing to come closer to "real-life" situations, we had deliberately chosen not to artificially modify the usual consultation procedures.

Lastly, we did not record subject demographics other than office location and adolescent gender; this appeared sufficient due to the diversity of selected sites and non-selection of the consulting adolescents. The main weakness of the study lies in the self-reported, subjective nature of the main outcome. However, our aim was for the test a way to alert GPs and encourage them to broach the topic of actual or intended suicidality, without necessarily quantifying its reality. From this standpoint, it fulfilled its function. Notwithstanding the artificial constraints associated with the protocol, this study suggests

that the BITS test is a simple and useful method helping to alert GPs to the suicidality history of 13-to-18-year-olds seen in primary care. It can easily be included in routine questioning.

Several points require further clarification: Will its performance be comparable in English-speaking settings? Can it help to reduce morbidity or mortality? What will be its degree of acceptability and use by GPs outside a study protocol? Further prospective studies should explore the ability of the test, not only to detect a past history of suicidality, but also to predict future events.

## ACKNOWLEDGEMENTS

We wish to thank the "Relais 17 association," which financed this study. We also thank for their collaboration Daniel Marcelli and Ludovic Gicquel of the "Conseil Scientifique"; Michel David, Caroline Huas, Louis Jehel, Catherine Laporte, Nassir Messaadi, Patrick Tabouring and Louis Tandonnet of the "Comité Scientifique" and as on-site correspondents; Philippe Castéra, Paolo Di Patrizio, Jean-Marc Franco, Catherine Jung, Pierre Mesthe, Michel Thomas and Marc Vanmeerbeek as on-site correspondents, and the 102 GPs who carried out the investigation. We also thank Jeffey Arsham for the translation and Yolanda Chen (MD, Tennessee USA) for her English editorial assistance.

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**How to cite this article:** Binder P, Heintz A-L, Haller DM, et al. Detection of adolescent suicidality in primary care: an international utility study of the bullying-insomnia-tobacco-stress test. *Early Intervention in Psychiatry*. 2019;1–7. https://doi.org/10.1111/eip.12828