

Improving Recognition of Adolescent Depression in Primary Care

Rachel A. Zuckerbrot, MD; Peter S. Jensen, MD

Objective: To address the following questions: (1) What evidence (ie, psychometric data collected in pediatric primary care, patient outcome data) exists for the various methods used to identify adolescent depression in primary care? and (2) What identification practices are currently in use?

Data Sources: We systematically searched MEDLINE for English-language articles using specific search terms and examined relevant titles, abstracts, and articles.

Study Selection: We reviewed 1743 MEDLINE abstracts. Seventy-four articles were pulled for examination, with 30 articles meeting full criteria.

Data Extraction: Five studies had adequate psychometric data on various adolescent depression identification methods in primary care. Only 1 compared the diag-

nostic accuracy of physicians trained to ask depression questions vs physicians trained in the use of a diagnostic aid. Six studies reported on current practice. Evidence regarding sensitivity, specificity, positive predictive value, and negative predictive value was sought for question 1. Frequency of screening was sought for question 2.

Data Synthesis: Review of these articles found that few health care professionals use systematic depression identification methods, despite some growing evidence for their validity, feasibility, and possible efficacy.

Conclusion: Available evidence indicates that primary care professionals would improve their rates of depression diagnosis through training, but even more so by using adolescent symptom rating scales.

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STUDIES HAVE FOUND THAT 3% to 9% of teenagers meet criteria for depression at any one time, and at the end of adolescence, as many as 20% of teenagers report a lifetime prevalence of depression.¹⁻⁴ Adolescent depression may affect the teen's socialization, family relations, and performance at school, often with potentially serious long-term consequences.⁵ Adolescents with depression are at risk for increased hospitalizations, recurrent depressions, psychosocial impairment, alcohol abuse, and antisocial behaviors as they grow up.⁶⁻⁸ Of course, the most devastating outcome of concern for adolescent depression is suicide, the third leading cause of death among older adolescents.⁹

Despite the severe morbidity and mortality associated with adolescent depression, most studies report that only 1 in 4 to 1 in 3 adolescents with depression are receiving treatment for this disorder.^{10,11} Extant data suggest that depression is relatively common in pediatric settings^{12,13} and is often unidentified by pediatric professionals.^{14,15} Pediatricians, however, do feel responsible for identifying adolescent depression¹⁶ and most of the major professional organizations have acknowledged the importance of identifying depression and suicidal behavior in youth.¹⁷⁻¹⁹ To improve the identification and

treatment of adolescent depression, primary care health professionals may need to adapt the service delivery models currently used in treating adults with depression. While depression screening and management are now considered to be an essential function of the primary care setting for adults,²⁰⁻²² no definitive recommendations have been made in support of adolescent depression screening in primary care.

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In light of the significant morbidity and mortality of adolescent depression; its high prevalence in pediatric primary care; the existence of promising treatments such as cognitive behavioral therapy,²³ interpersonal therapy for adolescents,²⁴ and medication²⁵ (despite the current "black box" warning²⁶); and its underrecognition by pediatricians despite their good intentions, it is surprising that no literature, to our knowledge, has systematically reviewed the available evidence regarding the various methods available and in use for the identification of adolescent depression in pediatric primary care. We conducted a literature search to determine (1) What evidence exists for the various methods

Author Affiliations: Division of Child and Adolescent Psychiatry, Department of Psychiatry, Columbia University and Center for the Advancement of Children's Mental Health, Columbia University/New York State Psychiatric Institute, New York.

used to identify adolescent depression in primary care? and (2) What identification practices are currently in use? Question 1 includes the following: (1) the availability of psychometric data assessing adolescent depression screening and identification methods in pediatric primary care and (2) available evidence regarding the feasibility, acceptability, cost, and benefit to patients of available identification methods.

METHODS

This search focused on psychometric data comparing the use of general psychosocial screening tools (eg, Child Behavior Checklist²⁷), depression-specific tools (eg, self-reports, health care professional-rated checklists), reliance on chief complaints, and the use of parent and/or adolescent interview techniques to identify adolescent depression in primary care. Psychometric data sought included sensitivity (the proportion of those with the disease or condition, as measured by the gold standard, who have positive results by the test being studied), specificity (the proportion of those without the disease or condition, as measured by the gold standard, who have negative results by the method, criteria, or test being studied), positive predictive value (PPV), and negative predictive value (NPV) of different identification methods. While the gold standard depression diagnosis typically would involve experienced mental health professionals using high-quality assessment techniques and gathering information from multiple informants, the gold standard diagnosis may be a structured interview or other such approximation. We sought studies that clearly defined their gold standard in primary care. In addition, any available evidence regarding the feasibility, acceptability, cost, and outcome for the adolescent patient of any of the various identification methods was sought. Lastly, by identifying methods currently used in pediatric primary care settings, we hoped to find explanations for the current underrecognition.

We searched MEDLINE (English-language articles only) for all years up through December 28, 2004, using the following key words: primary care or pediatric\$ (\$ indicates a wild-card term) or family med\$ or GP or health clinic or health center or teen clinic or teen center or adolescent clinic or adolescent center or family physician\$ or family practi\$ or adolescent medicine or ambulatory care and depress\$ or mood\$ and adolesc\$ or teen\$. Articles targeting populations with specific somatic symptoms, physical illnesses, or other risk factors; studies not focusing on adolescents; or those discussing children generally but not separating out older children (older than 10 years) were eliminated. Articles that dealt with general psychosocial issues, psychological distress, or suicidality, rather than depression, were included only if depression or mood disorders were also mentioned in the abstract and then specifically examined in the study as well. Population surveys and service use assessments were discarded because they did not take place in primary care, as were treatment articles that did not describe the mechanism of identification. Lastly, English-language articles that described screening conducted in non-English-speaking countries were discarded. In addition, a hand search of the references from the relevant articles found in the search was also conducted.

RESULTS

We identified and hand reviewed 1743 titles (most with abstracts). Seventy-four full articles were selected for initial review based on relevance. Twenty-nine articles met

criteria for final review: 24 addressed the first question regarding identification methods in primary care (**Table 1**) and 6 (including 1⁴⁹ from Table 1) focused on health care professional-reported current practices (**Table 2**). Final results from a previously published study³¹ were published in January 2005 and that article is included as the 25th article³⁴ in Table 1.

IDENTIFICATION DATA IN PRIMARY CARE (QUESTION 1 PART 1)

Of the 25 articles presented in Table 1, only 5 present data on the sensitivity, specificity, PPV, and NPV of a designated identification method in primary care. In the first of the 5 studies, Winter et al⁸² trained pediatricians to administer the mood module of the Primary Care Evaluation of Mood Disorders⁴⁵ to 100 consecutive adolescents. Using the Primary Care Evaluation of Mood Disorders interview as the gold standard to validate a self-report (Beck Depression Inventory for Primary Care⁸³), analyses demonstrated a sensitivity and specificity of 91% at a cutoff score of 4 or higher. With their sample prevalence of 11% for major depressive disorder, the PPV for the Beck Depression Inventory for Primary Care was 55.6% and the NPV, 98.7%.

In the second study, Johnson et al⁴³ attempted to validate the Patient Health Questionnaire for Adolescents, which assesses depression, eating disorders, and substance use. Using a mental health professional-administered telephone interview based mostly on the Primary Care Evaluation of Mood Disorders mood module as the gold standard diagnosis, the Patient Health Questionnaire for Adolescents yielded a sensitivity of 73%, specificity of 94%, and PPV of 56% for major depressive disorder, which rose to 62% for "any depressive disorder" (n=403).

In the third study, Schubiner and colleagues⁷² examined the accuracy of physician diagnosis aided by a self-report questionnaire, as well as the accuracy of physician diagnosis based on a mnemonic verbal interview, comparing both with a gold standard, semistructured, psychologist-administered interview. Physicians at an urban adolescent clinic were randomized into 2 groups, 1 trained to use the Safe Times Questionnaire⁷³ (a 7-subscale screen with 1 subscale for depression/suicide comprising 5-7 items) vs 1 trained to conduct interviews based on the Safe Times Questionnaire mnemonic verbal interview. This latter group was not as accurate in depression identification as the Safe Times Questionnaire screening tool group, with area under the receiver operating characteristic curves of 88% for the screen vs 50% for the interview ($P<.05$), sensitivity of 80% vs 18% ($P<.05$), specificity of 91% vs 93%, PPV of 71% vs 43%, and NPV of 95% vs 80% ($P<.05$).⁷² In this study, depression prevalence was 21%.

In the fourth study, Yates et al⁸⁴ administered the Mood and Feelings Questionnaire⁴⁰ to 267 adolescent primary care attendees in Great Britain, with the urban subgroup (n=130) also receiving the Schedule for Affective Disorders and Schizophrenia for School-Age Children⁴² diagnostic interview. Full details of this study are described elsewhere.¹⁵ Based on receiver operating characteristic curve analyses from an earlier study,¹⁵ investigators chose a cutoff score of 17, rather than the accepted 26 in clinical samples, to

Table 1. Identification Methods for Adolescent Depression Studied in Primary Care (in Alphabetical Order)

Source	Description of Sample	Study Identification Methods	Methods Integrated Clinically	Comparisons	Impact Assessed	Psychometric Data	Notes
Adams et al, ²⁸ 2003	Aged 11-19 y; N = 193; prevalence: high-risk mood, 4.2% and moderate-risk mood, 15.7% as per PARS ²⁸ ; variable setting: 69.9% of sample recruited from university-based adolescent medicine clinic, 14.5% from public middle school, and 15.5% from public high school	DSR (CDI ²⁹), GSR+ (PARS-SE, ²⁸ GAPS ¹⁷), HRCL (PARS), OSR (IC ³⁰)	No	Used CDI as GS to validate PARS; compared PARS with GAPS	No	Pearson correlations between mood and total CDI score, $r = 0.58$; $P < .01$	Pearson correlations between PARS mood and GAPS mood, $r = 0.48$; $P < .01$
Asarnow et al, ³¹ 2002	Aged 13-22 y; sample size not reported; prevalence not reported; setting: 5 practices including managed care, academic, and public sector	DSR (CES-D ³²), HRCL (CIDI ³³)	No	GS (diagnostic interview)	Yes (usual care vs QI treatment; results published in Asarnow et al ³⁴)	Fewer than half with liberally defined positive screenings meet criteria for a depressive disorder as per preliminary reports	
Asarnow et al, ³⁴ 2005	Aged 13-21 y; N = 4002 screened; prevalence: NA; setting: 6 pediatric practice settings from 5 health care organizations	DSR (CES-D) (modified CIDI-12)	No	GS (diagnostic interview)	Yes; CES-D scores improved in QI group	NA	
Burns et al, ³⁵ 2004	Aged 12-18 y; N = 64; prevalence: 28.3%-31.25% (based on PARS screening variable); recruitment setting: university-affiliated pediatric and adolescent group practice clinic	DSR (CDI), HRCL (PARS)	OS (PARS only), No PCP (PARS only)		Yes (longitudinal relationships between baseline depression variables, follow-up risk variables, and mental health intervention)	NA	
Cappelli et al, ³⁶ 1995	Aged 13-18 y; N = 104; prevalence: 41% (BDI ³⁷ score > 16); setting: Canadian adolescent medicine clinic that often receives mental health referrals	DSR (BDI), OSR (SPS ³⁸)	No	CC	No	NA	
Gledhill et al, ³⁹ 2003	Aged 13-17 y; N = 10 GPs, 184 adolescents; prevalence: 11%; setting: central London GP practice	DSR (MFQ ⁴⁰), OSR (CSI ⁴¹), AI+ HRCL (DSM-IV depression screen)	PCP (AI only + or - HRCL)	GS (K-SADS ⁴²) vs PCP-ID (AI + or - HRCL), PCP (AI) before and after training	Yes (3-mo follow-up for group with depression)	MFQ PPV (combined), 38% (n = 82); AI pretraining: sensitivity, 20%; specificity, 86%; PPV, 33%; AI posttraining: sensitivity, 43%; specificity, 87%; PPV, 75%; MFQ found 21 teens diagnosed with depression by the K-SADS vs GPs finding 9 teens diagnosed with depression by the K-SADS but falsely screened positive 20 teens not found to have depression on the K-SADS vs GPs falsely screening positive 3 teens not found to have depression on the K-SADS	While GPs trained in use of a DSM-IV depression screen, no mention of its use during the clinical interview is confirmed in the article
Johnson et al, ⁴³ 2002	Aged 13-18 y; N = 403; prevalence: 11.9% (any depressive disorder); setting: school clinics and primary care practices	DSR (Patient Health Questionnaire mood module), GSR (PHQ-A, ⁴³ SF-20 ⁴⁴)	No	GS (phone interview by MHP with PRIME-MD ⁴⁵ mood module)	No	PHQ-A mood module major depressive disorder: sensitivity, 73%; specificity, 94%; PPV, 56%; NPV, 97%	Data also provided for depressive disorder and any mood disorder

(continued)

Table 1. Identification Methods for Adolescent Depression Studied in Primary Care (in Alphabetical Order) (cont)

Source	Description of Sample	Study Identification Methods	Methods Integrated Clinically	Comparisons	Impact Assessed	Psychometric Data	Notes
Joiner et al, ⁴⁶ 2002	Aged 15-24 y; N = 2851; prevalence: NA; setting: GP clinics	DSR (CES-D), GSR (GHQ-12 ⁴⁷), OSR (DSI-SS ⁴⁸)	OS	CC	No	NA: distribution of scores, means, and comparisons between measures presented	
Joiner et al, ⁴⁸ 2002	Aged 15-24 y; N = 2851; prevalence: NA; setting: GP clinics	DSR (CES-D), GSR (GHQ-12), OSR (DSI-SS)	OS	CC	No	NA	
Klein et al, ⁴⁹ 2001	Aged 14-19 y; n = 318 teens preintervention, 331 teens postintervention; prevalence: NA; setting: 5 community and migrant health centers in 3 different states, 11 clinical sites in both urban and rural areas including 3 school-based health clinics and 1 teen clinic	GSR+ (GAPS), PR (GAPS)	OS, PCP	No	No	NA	
Kramer and Garralda, ¹⁵ 1998	Aged 13-16 y; N = 131; prevalence: 21% (any depressive disorder); setting: GP clinics	PR (CBCL ²⁷), OSR (CSI and unspecified others), AI	PCP (AI)	GS (K-SADS) vs AI (for any psychiatric disorder)	No	AI pretraining vs any psychiatric disorder: sensitivity, 21%; specificity, 91%; PPV, 59%	Mean and total scores on the CSI were increased in adolescents with psychiatric disorder
Lipschitz et al, ⁵⁰ 2000	Aged 12-21 y; N=90; prevalence: NA; setting: urban adolescent primary care clinic	DSR (BDI), OSR (CEVC, ⁵¹ CTQ, ⁵² child PTSD checklist, ⁵³ MASC, ⁵⁴ PESQ, ⁵⁵ FACESIII, ⁵⁶ LEQ-A ⁵⁷)	No	BDI in those with PTSD and those without	No	NA	Mean BDI scores compared in adolescent females with full PTSD, partial PTSD, and no PTSD in an urban primary care clinic
Logan and King, ⁵⁸ 2002	Aged 12-18 y; N=477 screened; prevalence: 60 of 477 screened positive; setting: 2 general pediatric outpatient clinics	DSR (RADS ⁵⁹), PR (CAFAS, ⁶⁰ CASA, ⁶¹ IPPA ⁶²)	No	GS (SCID ⁶³ and parental DISC ⁶⁴)	No	60 of 477 screened positive but only 50 consented to the SCID; 44 met <i>DSM-IV</i> criteria ⁶⁵ for major depressive disorder, depressive disorder, or minor depression with an estimated PPV of at least 73.3%	
McKelvey et al, ⁶⁶ 1998	Aged 15-24 y; N=69; prevalence: 31.9% had score ≥16 on CES-D; setting: 5 GP clinics	DSR (CES-D), GSR (GHQ-12), OSR (DSI-SS)	OS	CC	No	NA	
McKelvey et al, ⁶⁷ 2001	Aged 15-24 y; N=2851; prevalence: 39.4% had score ≥16 on CES-D; setting: GP clinics	DSR (CES-D), GSR (GHQ-12), OSR (DSI-SS)	OS	CC	No	NA	
Pfaff et al, ⁶⁸ 2001	Aged 15-24 y; N=423; prevalence: 34.2% had score ≥16 on CES-D; setting: GP clinics	DSR (CES-D), GSR (GHQ-12), OSR (DSI-SS), AI	PCP (AI: GP underwent 1 day of training to recognize psychological distress and suicidal risk)	CC, PCP	Yes; patient treatment changes examined	NA	
Schichor et al, ⁶⁹ 1994	Mean age 15.5 y; N=966; prevalence: 22% reported feeling down frequently; setting: inner-city adolescent medicine service	GSR+ (unnamed)	OS, PCP	No	Yes; while no control or comparison, counseling and referral outcomes examined	NA	
Schubiner and Robin, ⁷⁰ 1990	Aged 13-23 y; N=226; prevalence: 14% moderate to severe BDI score; setting: center for high-risk inner-city adolescents and young adults	DSR (BDI, 7-item questionnaire with 3 depression-specific questions), OSR (CBQ ⁷¹), AI	OS (unclear), PCP (AI only)	3 screening questions vs BDI as GS, PCP vs BDI	No	3 depression screening questions: PPV, 100%; NPV, 87%; sensitivity, 10%; specificity, 100%; physician: sensitivity, 23%; specificity, 93%; PPV, 33%, NPV, 89%	Receiver operating characteristic curve analysis presented and different data for varying cut points presented

(continued)

Table 1. Identification Methods for Adolescent Depression Studied in Primary Care (in Alphabetical Order) (cont)

Source	Description of Sample	Study Identification Methods	Methods Integrated Clinically	Comparisons	Impact Assessed	Psychometric Data	Notes
Schubiner et al, ⁷² 1994	Aged 14-23 y; N=152; prevalence: 21%; setting: university-affiliated adolescent and young adult primary care center	DSR (STQ ⁷³ with depression-specific questions), AI (STQ mnemonic-based interview)	OS (STQ and AI), PCP (STQ and AI)	GS (psychologist interview)	No	Area under the curve: AI, 50%; STQ, 88%; sensitivity: AI, 18%; STQ, 80%; specificity: AI, 93%; STQ, 91%; PPV: AI, 43%; STQ, 71% NPV: AI, 80%; STQ, 95%	
Slap et al, ⁷⁴ 1992	Aged 12-19 y; N=332; prevalence: 2% by YSR ⁷⁵ in non-suicide attempters, 19% by YSR in suicide attempters; setting: teen health clinic in a large county hospital	GSR + (YSR), OSR (Offer family relationship subscale, ⁷⁶ a brief pretested questionnaire about suicidal ideation and attempts, mental health care, and marijuana use),	None	CC (in suicide attempters vs nonattempters), PCP	No	NA	Depression as measured by the YSR subscale can help identify suicide attempters
Smith et al, ⁷⁷ 2001	Aged 16-30 y; N=51; prevalence: 10%-24% had sad/depressed feelings "a lot" to "all the time"; setting: teen health clinic in a large county hospital	GSR (problem area checklist with 8 areas and a problem symptom checklist)	OS	No	No	NA	
Smith et al, ⁷⁸ 1990	Aged 10-17 y; N=205; prevalence: 83 of 205 with any psychiatric disorder; setting: adolescent clinic	DSR (CDI), OSR (STAI ⁷⁹)	OS, PCP	CC, PCP	No	NA	
Walker et al, ⁸⁰ 2002	Aged 14-16 y; N=970; prevalence: 17.1% females and 11.9% males had score ≥ 16 on CES-D; setting: 8 GP practices	DSR (CES-DC ⁸¹), GSR (packet of questionnaires)	No	No	Yes, 3- and 12-mo follow-up	NA	
Winter et al, ⁸² 1999	Aged 12-17 y; N=100; prevalence: 11%; setting: suburban outpatient pediatric practice	DSR (BDI-PC ⁸³), AI (PRIME-MD mood module)	OS (BDI-PC), PCP (AI)	GS (PRIME-MD)	No	Score ≥ 4 : 91% sensitivity and specificity; area under the curve, 0.98; PPV, 55.6%; NPV, 98.7%	
Yates et al, ⁸⁴ 2004	Aged 13-16 y; N=267; prevalence: 15%-33% (MFQ cutoff score); setting: GP clinics, 1 urban and 2 suburban	DSR (MFQ), OSR (CSI), AI, PR (CBCL)	PCP (AI)	GS (K-SADS in urban group), CC, PCP	No	PPV, 38% (calculated from the article by Gledhill et al. ³⁹) and based on a cutoff score ≥ 17 , chosen for optimal sensitivity and specificity using receiver operating characteristic curve MFQ data from the urban sample	

Abbreviations: AI, adolescent interview; BDI, Beck Depression Inventory; BDI-PC, Beck Depression Inventory for Primary Care; CAFAS, Child and Adolescent Functional Assessment Scale; CASA, Child and Adolescent Services Assessment; CBCL, Child Behavior Checklist; CBQ, Conflict Behavior Questionnaire; CC, chief complaint; CES-D, Center for Epidemiologic Studies Depression Scale; CES-DC, Center for Epidemiologic Studies Depression Scale for Children; CDI, Children's Depression Inventory; CEVC, Child Exposure to Violence Checklist; Child PTSD Checklist, Child Post-Traumatic Stress Disorder Checklist; CID-I, Composite International Diagnostic Interview; CSI, Children's Somatization Inventory; CTQ, Childhood Trauma Questionnaire; DISC, Diagnostic Interview Schedule for Children Version 2.3; DSI-SS, Depression Symptom Inventory-suicidality subscale; *DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*; DSR, depression self-report; FACES III, Family Adaptability and Cohesion Evaluation Scales; GAPS, Guidelines for Adolescent Preventive Services¹⁷; GHQ-12, General Health Questionnaire; GP, general practitioner; GS, gold standard; GSR, general self-report; HRCL, health care professional-rated checklist; IC, Issues Checklist; IPPA, Inventory of Parent and Peer Attachment; K-SADS, Schedule for Affective Disorders and Schizophrenia for School-Age Children; LEQ-A, Life Events Questionnaire for Adolescents; MASC, Multidimensional Anxiety Scale for Children; MFQ, Mood and Feelings Questionnaire; MHP, mental health professional; NA, not available; NPV, negative predictive value; OS, administered by office staff; OSR, other self-report; PARS, Perkins Adolescent Risk Screen; PARS-SE, Perkins Adolescent Risk Screen-Self-Evaluation; PCP, results used by primary care professionals; PCP-ID, primary care professional identification rates; PESQ, Personal Experience Screening Questionnaire; PHQ-A, Patient Health Questionnaire for Adolescents; PPV, positive predictive value; PR, parent report; PRIME-MD, Primary Care Evaluation of Mood Disorders; PTSD, posttraumatic stress disorder; QI, quality improvement; RADS, Reynolds Adolescent Depression Scale; SCID, Structured Clinical Interview for *DSM-IV* Axis I Disorders; SF-20, Medical Outcomes Study Short-Form General Health Survey; SPS, Suicide Probability Scale; STAI, State-Trait Anxiety Inventory; STQ, Safe Times Questionnaire; YSR, Youth Self-Report; +, with depression-specific questions; -, without depression-specific questions.

provide optimal sensitivity and specificity in their adolescent population with an estimated depression prevalence of 20%. Total and internalizing parent Child Behavior

Checklist²⁷ scores were modestly correlated with adolescent-rated mood symptoms (Spearman $\rho=0.203$ and 0.239 ; $P<.002$ and $<.001$, respectively).⁸⁴ Recalculation of the data

by Yates and colleagues, which is presented in Table 1 in a different article (by Gledhill et al³⁹, indicates that the Mood and Feelings Questionnaire yielded a PPV of 38% (n=82).

The fifth and final study³⁹ is a follow-up to the Yates et al study⁸⁰ and relied on Mood and Feelings Questionnaire cutoff scores of 17 for first-stage screening. Gledhill et al³⁹ trained 10 London general practitioners (GPs) in identification and management of adolescent depression and use of an unspecified, structured *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*⁶⁵ (DSM-IV)-based depression questionnaire while interviewing the adolescent. Blinded-GP diagnosis was compared with gold standard diagnosis made by positive first-stage Mood and Feelings Questionnaire screens and follow-up Schedule for Affective Disorders and Schizophrenia for School-Age Children⁴² interviews. Of 184 adolescents seen, physicians improved pretraining sensitivity and PPV (20% and 33%) to 43% and 75% posttraining, respectively. While improved, GPs still failed to identify more than half of adolescents with depression.

While, to our knowledge, these 5 articles represent the best psychometric data available, 2 other studies (3 articles) from Table 1 used a 2-stage screening method to provide some data on PPVs but not sensitivity or specificity. One of these studies is the Youth Partners in Care study,^{31,34} in which Asarnow et al preliminarily report a PPV lower than 50% for any depressive disorder using the Center for Epidemiological Studies Depression Scale³² (CES-D) and questions from the Composite International Diagnostic Interview.³³ In the second study, Logan and King⁵⁸ administered the Reynolds Adolescent Depression Scale⁵⁹ in a general pediatric clinic and obtained data suggesting PPVs of 73.3% to 88% for "any DSM-IV depressive disorder." Among youth identified as having depression based on the second-stage youth report, 79% of parents failed to endorse a single depression symptom.

In addition, another 6 studies provide some limited data about identification methods in primary care. Pfaff et al⁶⁸ trained primary care professionals to identify youths at risk for suicidality and found that physicians' ability to recognize high scorers on the CES-D (score ≥ 16) increased from 45.1% to 62.9% after training. No definitive diagnostic assessment was used, limiting firm conclusions about training. Another study, by Adams et al,²⁸ validated a health care professional-rated, general, psychosocial, adolescent risk screen that included 1 depression question, The Perkins Adolescent Risk Screen (PARS). Medical personnel were trained to use the PARS, while adolescents completed the Children's Depression Inventory²⁹ (CDI), a Periodic Adolescent Preventive Services Visit Form of the American Medical Association's Guidelines for Adolescent Preventive Services¹⁷ (GAPS), and a PARS self-evaluation.²⁸ The single PARS mood item correlated significantly with total CDI score ($r=0.58$; $P<.01$) and with mood items from the GAPS ($r=0.48$; $P<.01$). The self-reported PARS mood item correlated significantly ($r=0.47$; $P<.001$; $n=188$) with the health care professional-rated mood item. In another adolescent medicine clinic study by Smith et al,⁷⁸ where positive State-Trait Anxiety Inventory⁷⁹ and CDI screens ($n=205$) were reassessed by physicians after their initial interview, screening identified 18 additional patients who

were initially missed. Study health care professionals were so impressed by their inability to associate certain medical complaints with psychological issues that they decided to adopt the CDI into routine clinical care.⁷⁸ Similarly, 3 other studies^{50,66,70} suggest that self-reports identify more youth at risk for depression than physician interviews alone. However, because these studies did not examine actual depression diagnoses, results are not definitive and may reflect some false-positive results.

Overall, of these 25 studies, only 1 study, the Schubiner et al⁷² study, directly compared, through a randomized controlled study, physician diagnosis (based on self-report screening tools), physician identification (based on trained interview), and gold standard mental health interviews. Only 4 studies^{49,50,58,84} collected information from parents about adolescents' mood symptoms, with only 2 of these studies^{58,84} reporting a comparison of the results, limiting any information about this specific identification question.

Ten* of the 25 studies explored in different ways how patients' chief complaints could identify patients at risk for depression. All suggest that sole reliance on chief complaint misses many youth with depression. In 1 study of chief complaints in an adolescent clinic,³⁶ while depression and suicidality were more prominent in those initially seen with either psychological complaints or a combination of medical and psychological complaints, depression symptom prevalence in the patients only with medical chief complaints was still high: 21% of those with just medical complaints scored 16 or higher on the Beck Depression Inventory.³⁷ Similar results are described in other studies.^{66-68,74,78,84}

CHALLENGES IN INCORPORATION OF IDENTIFICATION METHODS INTO CLINICAL PRACTICE (QUESTION 1 PART 2)

Although researchers screen teenagers for study purposes, this does not necessarily suggest feasibility of screening in routine primary care. Ten studies^{46,48,49,66-69,72,77,78} mention that the clinic or practice staff or receptionist administered the self-report identification tools to the adolescent patients, with an 11th study³⁵ having practice health care professionals administer and rate adolescent risk checklists. Of these 11, only 5^{35,49,69,72,78} had health care professionals use results of the identification tools clinically, with a sixth⁷⁷ using clinic case managers to follow up on identified problems.

In 1 of these 11 studies, the Schubiner and colleagues⁷² study of the Safe Times Questionnaire, less health care professional time was spent with patients given the questionnaire vs the interview, despite more sensitive and equally specific diagnosis with the questionnaire. The 23-second difference (75 seconds vs 98 seconds), however, was not found to be significant. In another of the 11 studies, the Burns et al study,³⁵ although the practice incorporated a health care professional-administered psychosocial risk screen (PARS) into routine care, a medical record review showed that only 49% of patients had a completed PARS.

*References 36, 46, 48, 50, 66-68, 74, 78, 84.

Table 2. Health Care Professional–Reported Current Adolescent Depression Identification Practice

Source, Year	Method	Response Rate, %	Sample Size	Screen for Depression	Screening Definition	Type of Visits
Halpern-Felsher et al, ⁸⁵ 2000	Mailed survey to health maintenance organization pediatricians asking about screening practices on 24 recommended services at routine visits	66.2	366	Seventeen percent of pediatricians report screening at least 80% of their adolescents for depression at preventive services visits; an estimated 46% of adolescents seen for preventive services visits were screened by all physicians together (SD, 36)	Screening was not defined but appears to mean asking about or assessing for depression in some form	Preventive services visit
Hodgman and Roberts, ⁸⁶ 1982	Mail/telephone survey to 55 practicing pediatricians in metropolitan Rochester, NY, and Syracuse, NY, asking about experience with suicide, normal responses, and history-taking practices	87	48	In history taking, 20.8% report routinely including suicidal symptoms	“Did the pediatrician customarily interview patients to discover the suicide-prone or depressed individual in routine history taking?”	Not defined
Klein et al, ⁴⁹ 2001	Surveys distributed preimplementation at 5 community and migrant health centers participating in a preventive services implementation protocol	97	79	Sixty-four percent report screening for depression and 53% report screening for suicidal thoughts	Screening was not defined but appears to mean asking about or assessing for depression/suicidal thoughts in some form	Preventive visits = nonacute care visits including checkups, health maintenance, sports, work and camp physicals, and routine gynecological visits
Marks et al, ⁸⁷ 1990	Mail survey to 356 members of the pediatric societies of Nassau and Suffolk Counties, New York	37	101	Fourteen percent routinely discuss depression with their adolescent patients	“Routinely inquired about and provided anticipatory guidance”	“Routinely discuss”
Middleman et al, ⁸⁸ 1995	Pediatric residents at a university children’s hospital were given 7 scenarios and asked to rate how likely they were to ask about and document high-risk behaviors	NA	64	Residents were most likely to ask about sexual activity (mean Likert = 2.6; median Likert = 2 [range, 1-5]; $P = .01$) and least likely to ask about depression (mean Likert = 3.8; median Likert = 4 [range, 1-5]; $P < .001$)	Defined as verbally asking about and documenting in the medical record	Seven scenarios ranged from an emergency visit for a finger laceration to a sports physical in a continuity clinic
Olson et al, ¹⁶ 2001	National cross-sectional survey of randomly selected primary care pediatricians	63	280	Twenty-seven percent reported using a screening instrument for behavioral issues ever but did not report on how often; 90% felt it was their responsibility to recognize adolescent depression; 46% lacked confidence that they could recognize depression	When asked about their last remembered case of adolescent depression ($n = 186$), none reported detection using a screening questionnaire and 17% reported detection by routinely asking depression questions; 30% endorsed a family member raising concerns and 69% reported initial clinical problems associated with depression	Asked about their last remembered case of depression

Abbreviations: NA, not available; SD, standard deviation.

Three^{39,68,72} of the 11 studies trained physicians in identification methods, thus incorporating these techniques into routine practice as a research component, with 2 stud-

ies^{39,68} showing improved identification after training. In addition, the Beck Depression Inventory for Primary Care validation study by Winter et al⁸² had pediatricians ad-

minister the Primary Care Evaluation of Mood Disorders mood module in clinical practice, but unfortunately, no information was given about the feasibility of such endeavors in nonresearch settings.⁸²

Two^{49,69} of the 11 studies incorporated adolescent general self-reports that included depression questions into practice. In 1,⁴⁹ 5 community health centers implemented the American Medical Association's GAPS into clinical practice. While a medical record review found GAPS screening forms in 76% of the medical records, this study was limited by selection of health centers most likely to succeed, receipt of university-provided technical assistance, and financial support for health center staff. This study did not examine how many adolescents with depression were found, but it demonstrated that the routine protocol significantly increased (1) adolescents' reported receipt of depression and suicide preventive services (pre-GAPS, 16% and 7%; post-GAPS, 34% and 22%, respectively; $P < .001$), (2) medical record documentation of depression and suicide screening (pre-GAPS, 3% and 2%; post-GAPS, 79% and 78%, respectively; $P < .001$), and (3) medical record documentation of family history of mental illness (pre-GAPS, 40%; post-GAPS, 53%; $P < .001$). Sustained feasibility of this protocol was not examined.

In the second study that incorporated general self-reports,⁶⁹ 1012 adolescents attending an inner-city adolescent clinic for routine care completed questionnaires covering several health topics. Health care professionals reviewed questionnaires that were not part of the medical record. Adolescents responded ($n = 966$) to questions regarding "being down or depressed," with 127 (22%) endorsing these items "weekly" or more often. Medical record review of 124 of 127 cases found physician documentation of youths' depressive symptoms in 81% ($n = 100$) of medical records, demonstrating that most physicians examined the questionnaires.

ASSESSMENT OF THE IMPACT OF IDENTIFICATION (QUESTION 1 PART 2)

Patient Outcomes

Merely identifying adolescent depression may not lead to improved patient care or better mental health. Six^{31,34,35,39,69,80} of the 25 articles in Table 1 did examine the impact of depression identification on patient outcomes. In the Burns et al study,³⁵ patients identified by medical record review as having been given a PARS previously were invited back to the clinic. At follow-up, a repeat PARS, CDI, and questionnaires studying mental health interventions were administered. While only 44% of follow-up youth reported "ever receiving a mental health intervention," 72% of those scoring "moderate" or higher on a baseline PARS and 50% of those scoring "moderate" or higher on a follow-up PARS reported receiving mental health interventions, although the study did not separate out the timing of the mental health intervention. Though this study did not make formal depression diagnoses, examine pathways to mental health intervention, and standardize the time between PARS scores, it does suggest that youth with previous positive PARS scores had higher rates of mental health intervention.

Only 1 (Asarnow et al Youth Partners in Care study^{31,34}) of the 6 studies attempted to implement a clinical response in primary care to self-report screens and to measure patient impact. As part of their quality improvement research initiative, evidence-based management was initiated in 1 screened arm with usual care in the other; the quality improvement group fared better, with lower CES-D scores at follow-up. Likewise, another 1³⁹ of the 6 studies found improvement in Children's Global Assessment Scale⁸⁹ scores in adolescents receiving GP depression interventions among GPs completing training. Yet another study⁸⁰ used CES-D for Children⁸¹ scores to measure the mental health impact of inviting teenagers to general practice consultations to discuss health behavior concerns and obtain appropriate follow-up care. While the CES-D for Children was not used as a screening tool per se, those with high scores (≥ 16) who came for the nurse consultation visits and were independently identified as having depression by the nurses had lower CES-D for Children scores on follow-up than those with high scores who never came for visits.

Finally, in another 1 of the 6 patient outcome studies, the Schichor et al⁶⁹ study, which incorporated general self-reports into clinical practice and did not have a comparison group, a medical record review demonstrated that of 100 adolescents with depression noted in the medical records, physicians counseled 33% ($n = 33$) and referred 51% ($n = 51$) for counseling. Follow-up showed that 55% ($n = 28$) of those referred completed the referral process. In total, 61% of those identified as having depression by the physicians received some form of counseling in the end, suggesting that implementing routine depression identification can yield tangible increases in care actually delivered.

Physician Management Outcomes

Two^{68,69} of the 25 studies examined physician management outcomes on some level. While 61% of the patients in the Schichor et al⁶⁹ study received counseling, physicians actively intervened (either through counseling or referral) in 84% of the cases they identified as having depression and in 67.7% of the 124 patients with self-reported depressive symptoms. While there is no gold standard diagnosis and no comparison group in this study, these data suggest that systematic use of "trigger questions" or self-report scales can affect physician behavior.

In contrast, the Pfaff study et al⁶⁸ found no changes in management strategies despite improved GP identification of suicidal risk factors and high scorers on the CES-D after GP training. However, to truly understand whether there was no impact, studies would need to follow through on patient outcomes.

CURRENT PRACTICE (QUESTION 2)

While the 25 articles from Table 1 provided some answers to our first question concerning the ways to identify adolescent depression in pediatric primary care, Table 2 represents the evidence for the second question concerning current practice. Six studies attempted to identify current depression identification practice by asking physicians directly either about their intentions or their reported ac-

tivities (Table 2). In 1 study, Halpern-Felsher and colleagues⁸⁵ mail-surveyed pediatricians (n=366; response rate, 66.2%) within a health maintenance organization, with only 15% and 17% reporting screening all (defined as at least 80%) of their adolescent patients for suicide and depression, respectively, at preventive services visits. Likewise, in a second study, Olson and colleagues¹⁶ surveyed a national sample of randomly selected pediatricians (response rate, 63%), finding that 46% lacked confidence that they could recognize depression, none recalling the use of any screening instrument during their last remembered case of adolescent depression and 17% using interview-based depression questions during their last remembered case of depression. Instead, identification was based mainly on chief complaints and family concerns. In a third study, Klein et al⁴⁹ reported that prior to GAPS implementation in several practices, health care professionals reported screening 64% and 53% of their patients for depression and suicidal thoughts, but medical record documentation of such practices was found in only 3% and 2%, respectively, rendering such high self-reported rates of questionable validity.

In a fourth study, Middleman et al⁸⁸ studied physicians' intentions to ask adolescents about high-risk behaviors. Using questionnaires, investigators presented 7 care scenarios to 64 pediatric residents, asking them to rate how likely they were to address 5 specific high-risk issues, including depression/suicide. Results indicated that residents were more likely to ask teens about sexual activity/birth control than any other high-risk behaviors. They were least likely to screen for suicide/depression and fighting/coping with anger.

Finally, 2 additional studies^{86,87} of pediatric professionals from 1982 and 1990, which are older and may not reflect current practice, reflect lower rates of asking patients about depression (14%)⁸⁷ and suicide (20.8%),⁸⁶ suggesting that despite physicians' feelings of responsibility¹⁶ and good intentions to address depression and suicide, it usually does not happen.

COMMENT

Complicating our understanding of comparisons between studies are the different criteria used for defining depression diagnoses. While no large studies randomized both physicians and youth and compared different identification methods against a gold standard, the studies examined suggest that adolescent self-report tools using recommended clinical cutoff scores identify more patients with depression than other methods and that some adolescent depression screening tools have adequate psychometric properties and feasibility characteristics for use in primary care. However, studies also suggest that using liberal screening criteria may result in overidentification and increase the burden of false-positive results.

While several of the reviewed articles used general psychosocial distress screening tools (vs instruments with depression-specific questions), and while others that screened for general adolescent distress were not included in our search specifically focused on depression, none of these articles addressed how well these questionnaires identified depression compared with a gold standard diagnosis. Thus, the use of general distress self-

reports (eg, General Health Questionnaire) without depression-specific trigger questions in pediatric primary care to identify adolescent depression cannot be endorsed or repudiated herein.

Interestingly, training physicians improved their ability to identify depression through interview but not to levels as high as when self-report tools were available. While the HEADSS (home, education, activities, drug use and abuse, sexual behavior, suicidality and depression) interview⁹⁰ assessment is often discussed in adolescent medicine, no studies of its incorporation into routine primary care for depression identification were found. Thus, we do not have any evidence that even physicians who may have adequate training are successfully using their skills in a systematic fashion. The Schubiner et al study⁷² is unique in that it studied physician diagnosis aided by a self-report tool, which approximates real-world clinical settings much more than just looking at the accuracy of cutoff scores for a screening instrument given in a vacuum with no additional clinical information. Lastly, the available evidence reviewed herein indicates that reliance on chief complaints alone is insufficient, because most patients with depression came in with medical complaints or for routine care.

STUDIES INCORPORATING IDENTIFICATION METHODS INTO CLINICAL PRACTICE

Studies reviewed herein that incorporated identification methods into clinical practice were limited in number and implementation design. A look at the larger literature on psychosocial issues in pediatric primary care can give some practical suggestions for facilitating clinical incorporation⁹¹⁻⁹⁵ and information regarding cost.^{96,97}

A final clinical issue not yet examined is how often adolescents need to be queried about their moods and at which type of visits. A study of psychosocial screening across ages showed that screening only at well-child visits misses a significant amount of psychosocial issues.⁹⁸ Our review also suggests that even at preventive services visits, physicians are often not screening for depression. Lastly, while self-reports may identify more teens with depression, the potential burden on practices of assessing false-positive results has not been adequately studied.

IMPACT ON PHYSICIAN BEHAVIOR AND YOUTH OUTCOMES

More research is needed on the assessment of impact. While 1 study⁷² did have physicians use depression self-report results to make diagnostic decisions, no single study combined all 3 necessary components: a screening component, an intervention, and an assessment of patient outcomes at follow-up. However, the Youth Partners in Care study^{31,34} did show that screening and triaging done by specialized staff in primary care will lead to better outcomes when proper management is put into place.

CURRENT PRACTICE

The studies cited herein suggest that not only is the use of adolescent depression self-reports rare but also that

systematic physician inquiry into the moods of teenagers has been difficult to achieve. Failure to use systematic reliance screening tools or depression trigger questions may be a critical component of the problem, particularly if not coupled with increased pediatric training in this area.

CONCLUSIONS

More research is needed to inform pediatric professionals about valid and feasible methods to identify adolescent depression and whether such identification will yield improved patient outcomes, but our review suggests that systematic use of adolescent self-reports with depression-specific questions may be a useful diagnostic aid to pediatric professionals. While improved pediatric diagnosis alone is unlikely to significantly change patient outcomes, recognizing teenagers with depression is the first step to improved depression management. The several studies available already suggest that adding primary care interventions for adolescent depression will be useful. With prolonged suffering and suicide as a potential consequence of undiagnosed depression, pediatric professionals may need to be more proactive and systematic in their depression identification methods.

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Correspondence: Rachel A. Zuckerbrot, MD, 1051 Riverside Dr, Unit 78, New York, NY 10032 (raz1@columbia.edu).

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