Depression and Suicide-Risk Screening Results in Pediatric Primary Care

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abstract

BACKGROUND AND OBJECTIVES: Depression is common, and suicide rates are increasing. Adolescent depression screening might miss those with unidentified suicide risk. Our primary objective in this study was to compare the magnitude of positive screen results across different approaches.

METHODS: From June 2019 to October 2020, 803 mostly Medicaid-enrolled adolescents aged ≥12 years with no recent history of depression or self-harm were screened with the Patient Health Questionnaire-9 Modified for Adolescents (PHQ-9A) and the Ask Suicide-Screening Questions (ASQ) across 12 primary care practices. Two PHQ-9A screening strategies were evaluated: screening for any type of depression or other mental illness (positive on any item) or screening for major depressive disorder (MDD) (total score ≥10).

RESULTS: Overall, 56.4% of patients screened positive for any type of depression, 24.7% screened positive for MDD, and 21.1% screened positive for suicide risk. Regardless of PHQ-9A screening strategy, the ASQ identified additional subjects (eg, 2.2% additional cases compared with screening for any type of depression or other mental illness and 8.3% additional cases compared with screening positive for MDD). Of those with ≥6 month follow-up, 22.9% screened positive for any type of depression ($n = 205$), 35.6% screened positive for MDD ($n = 90$), and 42.7% with a positive ASQ result ($n = 75$) had a depression or self-harm diagnosis or an antidepressant prescription.

CONCLUSIONS: Suicide risk screening identifies cases not identified by depression screening. In this study, we underscore opportunities and challenges in primary care related to the high prevalence of depression and suicide risk. Research is needed regarding optimal screening strategies and to help clinicians manage the expected number of screening-identified adolescents.

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WHAT'S KNOWN ON THIS SUBJECT: Primary care clinicians are recommended to screen adolescents for depression. Adolescent suicide risk has increased. Little is known about the yield of depression and suicide risk screening in primary care.

WHAT THIS STUDY ADDS: Many adolescents with unrecognized depression or suicide risk screen positive. Suicide risk screening detects additional cases compared with depression screening alone. Primary care practices must have systems in place to respond to the potentially high number of adolescents detected through screening.

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The US Preventive Services Task Force (USPSTF) recommends screening adolescents ≥12 years of age for major depressive disorder (MDD) with "adequate systems in place to ensure accurate diagnosis, effective treatment, and appropriate follow-up."[1] Although the USPSTF focused on MDD in its recommendation, many adolescents have clinically meaningful depressive symptoms and might benefit from low-intensity interventions to prevent or delay the onset of MDD.[2,3]

To assist pediatricians and other primary care clinicians in recognizing and providing comprehensive care for depression, the American Academy of Pediatrics endorses the Guidelines for Adolescent Depression in Primary Care (GLAD-PC), which provides a comprehensive evidence-informed toolkit and approach to its implementation.[4,5] The GLAD-PC emphasizes the importance of tailoring depression screening to the targeted population and available resources within the practice and community.

The Patient Health Questionnaire-9 (PHQ-9) is a 9-question depression-screening tool initially developed for adults.[6] The GLAD-PC recommends the Patient Health Questionnaire-9 Modified for Adolescents (PHQ-9A), which has been tailored for adolescents and includes questions on persistent depressive disorder, past-month suicidal thoughts, and lifetime history of suicide attempts. Although the PHQ-9A has not been validated under research conditions, the GLAD-PC describes different scoring thresholds to screen for any depression or other mental illness; screen for mild, moderate, or moderately severe depression; screen for dysthymia; screen for suicide risk; help establish the diagnosis of MDD; or monitor adolescents previously diagnosed with depression.

In contrast to adolescent depression screening, the USPSTF found insufficient evidence to recommend or advise against suicide-risk screening,[1] despite suicide being an important cause of mortality. Similarly, the American Academy of Pediatrics does not recommend routine specific suicide risk screening as part of adolescent preventive care but does recommend that primary care pediatricians be able to assess for suicide risk and act on it when recognized.[7] Suicide is the second most-common cause of death for adolescents, and the rate increased by 56% from 2007 to 2017.[8] Between 2009 and 2019, the proportion of high school students reporting at least 1 suicide attempt in the previous 12 months increased from 6.3% to 8.9%.[9] Although Black adolescents have historically had lower rates of suicide in comparison with white adolescents, a recent report revealed that Black adolescents were the only racial or ethnic group to experience an increase in the rate of suicide attempt between 1991 and 2017.[10] Girls are more likely to have suicidal ideation and attempt suicide, and boys are more likely to die by suicide, but this gap might be narrowing.[11] Healthy People 2030, the US Department of Health and Human Services' 10-year plan to improve the health of all Americans, has set a target of reducing suicide attempts among high school students from 2.4% to 1.8%.[12] It has also set a target to increase the proportion of adolescents and adults screened for depression during primary care visits from 8.5% to 13.5%[13] and increase the proportion of adolescents with depression who get treatment from 41.4% to 46.4%.[14]

Depression screening can help to identify those with suicide risk. In addition, some depression risk screening tools, such as the PHQ-9A, include questions specifically about suicide. However, little is known about the additional yield of depression screeners modified to include questions about suicide risk or the additional yield of using a separate screener specifically to identify suicide risk.

One of the key issues facing busy primary care practices is the yield of cases identified by screening because of the time and resources necessary for follow-up evaluation and care. In one study of primary care screening results with the Patient Health Questionnaire-9 Modified for Teens (equivalent to the PHQ-A) of nearly 7000 adolescents 16 years of age, researchers found that 26% screened positive (≥11 total score), with higher rates among girls, those in minority racial or ethnic groups, and those enrolled in Medicaid.[15] In addition, 8.6% screened positive on the additional suicide risk questions, 55.1% of whom were below the threshold used for a positive depression screen result. In another study of 12 690 adolescents aged 12 to 18 years screened with the Patient Health Questionnaire-9 Modified for Teens, researchers focused on suicide risk assessment and found that "3.6% ($N = 450$) of patients endorsed lifetime suicide attempts, 2.4% ($N = 303$) endorsed serious ideation in the past month, and 0.9% ($N = 110$) endorsed both."[16]

In contrast to the PHQ-9A, the Ask Suicide-Screening Questions (ASQ) screens specifically for suicide risk, not depression. It has been validated in emergency departments,[17] with a sensitivity of 96.9% and specificity of 87.6%. A recent study of 180 adolescents recruited from a primary care clinic reported 15.6%

screening positive and a sensitivity of 100% and a specificity of 87.9% for suicide risk.[18]

The primary objective of this study was to evaluate the magnitude of positive screens for adolescent depression using the PHQ-9A and the incremental yield of positive screens for suicide risk with the ASQ. We considered different thresholds for PHQ-9A screening recommended by the GLAD-PC tool kit and the degree to which specific questions on each instrument contributed to positive screen results. We also evaluated the degree to which patient factors were associated with positive screen results. This project was not designed to assess test accuracy (eg, sensitivity, specificity) of screening. Because the PHQ-9A is already recommended for routine depression screening and the ASQ targets suicide risk, our main interest was in understanding the additional yield of positive cases. Determining accuracy of these screening tests is also challenging. For example, considering only the presence of MDD or imminent risk of suicide as the gold-standard criteria would undervalue preventive interventions to address more mild forms of depression or suicide risk that could be addressed without specialized mental health services. However, as an exploratory outcome, we explored subsequent diagnosis of depression or self-harm and antidepressant treatment among those with a positive screen result. These findings do not reflect the positive predictive value of screening because these outcomes would miss subthreshold diagnoses and a wide array of other interventions. These findings do give some insight into severity among those with a positive screen result.

This project began before the start of the coronavirus disease 2019 (COVID-19) pandemic. As a secondary analysis, we evaluated whether the proportion of positive screens for depression or suicide risk increased after the COVID-19 pandemic based on reports of the impact of mitigation activities on the risk of social isolation and loneliness on adolescent depression and anxiety.[19]

METHODS

Study Setting

The Nationwide Children's Hospital Primary Care Network consists of 12 primary care practices in Columbus, Ohio. The network provides care for >100 000 children and adolescents, most of whom are Medicaid-enrolled and belong to a racial or ethnic minority group. Each clinic has social workers and, during the study, 6 to 7 of the clinics had integrated psychologists. The clinics without integrated psychologists had real-time access to psychology or psychiatry support via a telephone consultation. The clinics share a common electronic medical record, which is also used across Nationwide Children's Hospital. Before June 2019, the start of the study, adolescents were screened for depression with the PHQ-9A as part of routine preventive care, with monthly screening rates typically >90% across the network. ASQ screening began in June 2019 in 2 clinics and was subsequently adopted across the network by September 2020, leading to an overall ASQ screening rate of 90%. The PHQ-9A and ASQ screens were completed by patients on tablet computers and automatically uploaded to the electronic medical record. For non–English-speaking adolescents, screening questions were asked by an interpreter, with responses recorded by nursing staff. Those with a positive PHQ-9A screen result were first evaluated by the primary care clinician to determine if additional action was required. After a positive ASQ screen result, integrated psychologists or social workers provided further assessment, safety planning, brief intervention, and triage.

Study Population

Subjects were included if they were ≥12 years of age and were screened with both the PHQ-9A and the ASQ during the same primary care visit occurring between June 2019 and October 2020. Subjects were limited to those who were not known to have depression or to self-harm on the basis of the problem list at the time of screening or having an antidepressant prescription (see Supplemental Information) from any Nationwide Children's Hospital clinic within the 6 months before screening. We excluded subjects without complete information on questions 1 to 9 on the PHQ-9A because of the inability to calculate the score. We also excluded subjects with missing information on questions 1 to 4 of the ASQ, unless 1 of the responses was "yes," because that alone is sufficient for a positive screen result. This study was approved by the Nationwide Children's Hospital Institutional Review Board with a waiver of informed consent.

Study Instruments and Classification of Results

We considered 2 PHQ-9A screening thresholds. The threshold for a positive screen for all types of depression or other mental illness (referred to as "screen for any type of depression") was a response of 2 or 3 in questions 1 to 8 or 1, 2, or 3 in question 9. The threshold for a positive screen suggestive of MDD (referred to as "screen for MDD") was a total score ≥10 in questions 1 to 9. The additional questions on the PHQ-9A (difficulty of problems in question 1–9, feeling depressed or sad most days in the past year, serious thoughts about ending life in

the past month, or ever making a suicide attempt) were evaluated separately. For the ASQ, an affirmative response to any of the 4 items was considered to be a positive screen result. A positive ASQ result prompts a fifth question to assess current suicidal ideation. In addition to evaluating the proportion of positive screen results, the specific responses to the individual questions on the instruments were evaluated to assess the drivers of a positive screen result.

Factors Associated With a Positive Screen Result

We evaluated the association of PHQ-9A and ASQ screening results with subject characteristics, including age, sex, self-reported race and ethnicity, preferred language at home, use of an interpreter in the clinic, and insurance status. Race and ethnicity were considered because of the disparities in suicide risk.[10] Sex is not routinely collected. We also evaluated the concordance between the PHQ-9A and ASQ and the incremental screening yield after different screening strategies. To explore the impact of the COVID-19 pandemic on depression or suicide risk screening results, we compared the total PHQ-9A score and ASQ results from before the pandemic (June 2019–March 2020), the initial pandemic period, when access to clinics was more restricted (April–July 2020), and the period when our clinic access was restored (August–October 2020).

Diagnoses and Antidepressant Treatment

As a secondary outcome, we evaluated whether there was a diagnosis of depression, a diagnosis of self-harm, or an antidepressant prescription within 6 months of a positive PHQ-9A screen for any type of depression, positive PHQ-9A screen for MDD, or positive ASQ result. We considered this an exploratory outcome. Diagnoses were based on any relevant *International Classification of Diseases, 10th Revision* (ICD-10) code (see Supplemental Information) within the primary care clinics or the judgment of a behavioral health clinician within Nationwide Children's Hospital. To be captured, the antidepressant medication must have been prescribed by a clinician within the Nationwide Children's Hospital system. These analyses were restricted to subjects with ≥6 months of follow-up time available after a positive screen result.

Statistical Analysis

The χ^2 tests were used for bivariate analyses of categorical data or Fisher's exact test was used when cell sizes were small. Confidence intervals around proportions were based on the binomial distribution. McNemar's test was used to assess the difference in the incremental proportion of subjects with a positive ASQ result compared with a positive PHQ-9A result. A nonparametric test for trend across ordered groups was used to evaluate the possible association of the timing of the pandemic with the PHQ-9A and ASQ results. $P < .05$ was considered to be statistically significant. Stata 16 (Stata Corp, College Station, TX) was used for all analyses.

RESULTS

Study Population

From June 2019 to October 2020, there were 972 adolescents who completed screening with the PHQ-9A and ASQ at the same visit. Of these, 105 had a history of depression only, 3 had a history of self-harm only, and 10 had a history of both depression and self-harm. Of the remaining 854 potential subjects, there were 7 with only an incomplete PHQ-9A, 43 with only an incomplete ASQ, and 1 with both an incomplete PHQ-9A and ASQ, for a study sample size of 803 subjects. Table 1 provides the characteristics of the subjects included in this study.

PHQ-9A and ASQ Screening Results

Overall, 56.4% of patients had a positive PHQ-9A screen for any type of depression and 24.7% had a positive PHQ-9A screen for MDD. The median PHQ-9A score among those with a positive screen for MDD was 14 (interquartile range: 11–17). Of those with a positive PHQ-9A screen for any depression, 43.7% (198 of 453) would also be categorized as having a positive screen for MDD. Overall, 12.6% (57 of 453) of those with a positive PHQ-9A screen for any depression and 24.2% (48 of 198) of those with a positive screen for MDD reported that the problems made it very or extremely difficult "to do ... work, take care of things at home or get along with other people."

The overall proportion with a positive ASQ screen result was 21.1%. Of those with a positive screen result, there were 6 subjects (3.6%) who answered affirmatively to "Are you having thoughts of killing yourself right now?" (ASQ follow-up question 5). Among those who responded on the PHQ-9A that they did not have suicidal thoughts in the past month, 13.2% (93 of 612) had a positive ASQ result.

Table 2 provides the screening outcomes stratified by subject characteristics. The proportion of patients with a positive PHQ-9A screen for any type of depression decreased with age ($P < .01$). However, there was no statistically significant difference by age in the proportion with a PHQ-9A screen positive for MDD or a positive ASQ result ($P = .18$ each). A greater proportion of girls compared with

TABLE 1 Subject Characteristics ($N = 803$)

Characteristic	% (*n*)
Age, y	
12–13	38.4 (308)
14–15	30.1 (242)
16–17	24.3 (195)
18–20	7.2 (58)
Sex	
Male	41.3 (332)
Female	58.7 (471)
Race and ethnicity[a]	
Non-Hispanic white	10.3 (83)
Non-Hispanic Black	60.7 (487)
Hispanic	18.6 (149)
Other	10.3 (83)
Home language and clinic interpreter use	
English	70.4 (565)
Spanish, no interpreter	2.7 (22)
Spanish, interpreter	13.2 (106)
Somali, no interpreter	4.6 (37)
Somali, interpreter	2.2 (18)
Other, no interpreter	3.5 (28)
Other, interpreter	3.4 (27)
Insurance[b]	
Medicaid only	79.3 (631)
Any private	13.8 (110)
Self-pay	6.9 (55)

[a] Missing = 1.
[b] Missing or other = 9.

boys had a PHQ-9A screen positive for any type of depression or for MDD or a positive ASQ result ($P <$ .001 each). Although there were no statistical differences by race/ethnicity for having a PHQ-9A screen positive for any type of depression ($P = .41$) or for MDD ($P = .11$), a lower proportion of non-Hispanic Black subjects had a positive ASQ result compared with those of other race or ethnicity (18.1% vs 25.6%; $P = .01$). There were 18.8% (151 of 803) who used an interpreter during the clinic visit. There were no differences by interpreter use in the proportion with a positive PHQ-9A for any type of depression (53.0% vs 57.2%; $P =$ .36) or MDD (26.5% vs 24.2%; $P =$ .60) or with a positive ASQ result (20.5% vs 21.2%; $P = .91$). However, there were statistical differences in the proportion when stratifying screening results by preferred home language. A lower proportion of subjects whose families preferred speaking Somali at home compared with other languages had a positive PHQ-9A for any type of depression (34.6% vs 58.1%; $P < .001$) or MDD (10.9% vs 25.7%; $P = .01$) or positive ASQ result (3.6% vs 22.3%; $P = .001$). The sample size is insufficient to compare differences in screening test results by interpreter use among subjects whose families preferred speaking Somali at home.

PHQ-9A Item Response

Table 3 lists the proportion of positive responses to each question on the PHQ-9A. The single most common positive response was related to trouble sleeping (question 3). Most (72.0%; 326 of 453) of the positive screen results were based on a positive response to >1 question on the PHQ-9A. Of the screens with positive results because of only 1 question, 28.4% (36 of 127) were for having little interest or pleasure (question 2) and 26.8% (34 of 127) were for trouble sleeping (question 3).

For the 2 additional questions on the PHQ-9A, 43.6% (350 of 802) reported feeling sad most days in the past year and 12.1% (97 of 803) had serious thoughts about ending their life in the past month. Among those who reported feeling sad in the past year, 16.9% (59 of 350) had a negative PHQ-9A for any type of depression and 52.0% (182 of 350) had a negative screen for MDD. Conversely, of those who reported not feeling sad in the past year, 35.6% (161 of 452) had a positive PHQ-9A for any type of depression and 6.4% (29 of 452) had a positive PHQ-9A screen for MDD. Among the 97 who reported suicidal thoughts in the past month, 5.2% (5) had a negative PHQ-9A for any depression and 36.1% (35) had a negative screen for MDD.

There were 13.0% who reported ever having a suicide attempt (104 of 800). Of these, 30.8% (32 of 104) reported suicidal thoughts in the past month. Of those who reported no suicidal attempts, 9.2% (64 of 696) reported suicidal thoughts in the past month.

Questions Associated With a Positive ASQ Result

Table 3 lists the proportion of positive responses to each question on the ASQ. The single most common positive response was to question 4, the historical question, "Have you ever tried to kill yourself?" Approximately one-half (47.9%; 81 of 169) of the screens with positive results were based on a positive response to >1 question on the ASQ. Of the screens with positive results because of only 1 question, most (61.4%; 54 of 88) were for question 4.

Incremental Magnitude of Positive Screening Results

Adding ASQ screening to PHQ-9A screening for either MDD or any

TABLE 2 PHQ-9A and ASQ Screening Results Stratified by Subject Characteristics

Subject Characteristic	PHQ-9A ($N = 803$)		ASQ ($n = 803$)
	Positive for Any Depression, % (n)	Positive for MDD, % (n)	Positive, % (n)
Overall	56.4 (453)	24.7 (198)	21.1 (169)
Age			
12–13 y	63.3 (195)	28.9 (89)	25.0 (77)
14–15 y	55.4 (134)	22.3 (54)	19.4 (47)
16–17 y	49.7 (97)	21.5 (42)	18.0 (35)
18–20 y	46.6 (27)	22.4 (13)	17.2 (10)
P	<.01	.18	.18
Sex			
Male	48.5 (161)	15.7 (52)	11.5 (38)
Female	62.0 (292)	31.0 (146)	27.8 (131)
P	<.001	<.001	<.001
Race and ethnicity			
Non-Hispanic white	65.1 (54)	27.7 (23)	31.3 (26)
Non-Hispanic Black	55.0 (268)	21.8 (106)	18.1 (88)
Hispanic	56.4 (84)	30.2 (45)	20.1 (30)
Other	56.6 (47)	28.9 (24)	30.1 (25)
P	.41	.11	<.01
Home language and clinic interpreter use			
English	58.9 (333)	24.4 (138)	22.0 (124)
Spanish, no interpreter	45.5 (10)	31.8 (7)	22.7 (5)
Spanish, interpreter	53.8 (57)	28.3 (30)	20.8 (22)
Somali, no interpreter	29.7 (11)	8.1 (3)	0 (0)
Somali, interpreter	44.4 (8)	16.7 (3)	11.1 (2)
Other, no interpreter	67.9 (19)	35.7 (10)	32.1 (9)
Other, interpreter	55.6 (15)	25.9 (7)	25.9 (7)
P	.01	.12	<.01
Insurance			
Medicaid only	57.7 (364)	24.1 (152)	20.4 (129)
Any private	48.2 (53)	24.6 (27)	19.1 (21)
Self-pay	60.0 (33)	29.1 (16)	29.1 (16)
P	.16	.67	.28

depression increased the number of adolescents with a positive screen result ($P < .0001$ each). Figure 1 illustrates the proportion of positive screening results from no PHQ-9A screening to 5 PHQ-9A-based screening strategies: past-month suicidal thoughts, PHQ-9A screen for MDD, past-month suicidal thoughts or a PHQ-9A screen for MDD, PHQ-9A screen for any depression, and past-month suicidal thoughts and PHQ-9A screen for any depression. Figure 1 also illustrates the incremental proportion of positive results from adding the ASQ. See the Supplemental Information for a table listing these proportions and confidence intervals. Although adding the ASQ increased the proportion of positive results regardless of the PHQ-9A screening strategy, the incremental positivity rate fell with lower thresholds for the PHQ-9A, from an additional 11.6% when using the PHQ-9A question about past-month suicidal thoughts (total positivity rate 23.7%) to 2.0% when using a PHQ-9A screen for any depression and the question about past-month suicidal thoughts (total positivity rate 59.0%).

Secondary Analysis: The COVID-19 Pandemic and Positive PHQ-9A or ASQ Screen Results

There was a significant decrease in the PHQ-9A screen positive rate for any type of depression during the initial pandemic period compared with the prepandemic period that then returned to prepandemic levels (June 2019 to March 2020: 65.4% [$n = 240$], April to July 2020: 51.1% [$n = 162$], August to October 2020: 62.1% [$n = 174$]; $P < .01$). There were no statistically significant differences over time related to the proportion with a positive PHQ-9A for MDD (June 2019 to March 2020: 30.3% [$n = 111$], April to July 2020: 24.9% [$n = 79$], August to October 2020: 31.1% [$n = 87$]; $P = .09$) or a positive ASQ result (June 2019 to March 2020: 30.0% [$n = 110$], April to July 2020: 19.9% [$n = 63$]; August to October 2020: 26.4% [$n = 63$]; $P = .35$).

Exploratory Analysis: Diagnosis or Antidepressant Therapy After a Positive Screen Result

Table 4 lists the proportion of adolescents with ≥6 months of follow-up after a positive PHQ-9A for any depression, a positive PHQ-

TABLE 3 Proportion Who Responded Positively to Each Item on the PHQ-9A or the ASQ

Question No.[a]	Question	Percent Positive (N = 803), %
PHQ-9A		
1	"Feeling down, depressed, irritable, or hopeless"	16.9
2	"Little interest or pleasure in doing things"	23.4
3	"Trouble falling asleep, staying asleep, or sleeping too much"	32.5
4	"Poor appetite, weight loss, or overeating"	16.1
5	"Feeling tired, or having little energy"	21.9
6	"Feeling bad about yourself or feeling that you are a failure or that you have let yourself or your family down"	18.8
7	"Trouble concentrating on things like school work, reading, or watching TV"	20.7
8	"Moving or speaking so slowly that other people could have noticed? Or the opposite: being so fidgety or restless that you have been moving around a lot more than usual"	9.2
9	"Thoughts that you would be better off dead or of hurting yourself in some way"	21.2
	"In the past year, have you felt depressed or sad most days, even if you felt OK sometimes?"	43.6[b]
	"Has there been a time in the past month when you have had serious thoughts about ending your life?"	12.1[b]
	"Have you EVER, in your WHOLE LIFE, tried to kill yourself or make a suicide attempt"	13.0[c]
ASQ		
1	"In the past few weeks, have you wished you were dead?"	9.8[d]
2	"In the past few weeks, have you felt that you or your family would be better off if you were dead?"	9.8[b]
3	"In the past week, have you been having thoughts about killing yourself?"	5.3[e]
4	"Have you ever tried to kill yourself?"	11.7[f]

[a] The PHQ-9A has 9 numbered questions followed by additional unnumbered questions. There are versions of the PHQ-9A with differing numerical order of the same questions. The ASQ has 4 questions. Both the PHQ-9A and the ASQ have an additional question regarding severity that is only completed when a prior question is positive, as described in the Results.
[b] 1 non-respondent.
[c] 3 non-respondents.
[d] 4 non-respondents.
[e] 5 non-respondents.
[f] 9 non-respondents.

9A for MDD, or a positive ASQ result who had a diagnosis of depression or self-harm or who were given an antidepressant prescription within 6 months. Overall, those with a positive PHQ-9A screen for MDD compared with those with a positive PHQ-9A for any depression were more likely to receive a subsequent diagnosis of depression or self-harm or prescription for an antidepressant (P = .03). There was no difference among those with a positive PHQ-9A for any depression or for MDD compared with a positive ASQ result in the likelihood of a subsequent diagnosis for depression or self-harm or prescription for an antidepressant (P = .42).

There were 18 subjects who had a positive ASQ result with a negative PHQ-9A for any depression, with 6-month follow-up data available for 6. None had a diagnosis of depression or received an antidepressant prescription and 1 had a diagnosis of self-harm. There were 67 subjects who had a positive ASQ result and a negative PHQ-9A for MDD, for whom 6-month follow-up was available for 26. Among these 26 subjects, 5 had a diagnosis of depression but not self-harm, 3 had a diagnosis of self-harm but not depression, and none received an antidepressant prescription, for an overall diagnosis or antidepressant treatment rate of 30.8%.

DISCUSSION

This study underscores the high prevalence of adolescent depression symptoms and suicide risk based on screening results. This is both a significant opportunity and a challenge for primary care clinicians. Using only the PHQ-9A, 24.7% to 56.4% of adolescents screened positive on the basis of whether the threshold was set to identify MDD or any type of depression, and separate from depression, 12.1% reported suicidal thoughts in the previous month. Regardless of how the PHQ-9A was interpreted, the ASQ identified additional cases of suicide risk.

Although there were subpopulations that had a higher proportion of positive depression and/or suicide-risk screen results (eg, younger age screening positive for any depression; girls screening positive for any depression, MDD, or suicide risk; or non-Hispanic white individuals screening positive for suicide risk), the overall high rate suggests not only the potential value of universal screening but also the need for efficient and effective primary and secondary prevention interventions for use in primary care.

The proportion of depression symptoms and suicide risk among patients whose families speak Somali at home was lower than other subjects in this study. Previous research has revealed that

FIGURE 1
Proportion with a positive screen result by the PHQ-9A screening strategy and incremental proportion with a positive ASQ screening result.

Somali adolescents report lower rates of suicidal ideation and behavior and similar levels of depressive symptoms compared with non-Hispanic white peers.[20] Future work is needed to assess whether this reflects issues related to missed cases due to lower screening validity versus additional protective factors among members of this community.

We found a statistically significant but not clinically meaningful decrease in the rate of positive screens for any type of depression at the start of the pandemic, which then returned to the prepandemic baseline. Over this time, there were no statistical differences in the rate of positive screens for MDD or suicide risk. These findings are not necessarily generalizable to those adolescents who were not seen for routine preventive care during this time, including those who might have suffered greater impairment related to the pandemic. However, the high rate of depressive symptoms and suicide risk present before the pandemic suggests that our patients have faced significant stressors. Pandemic-related changes, including remote schooling, stay-at-home orders, and greater financial distress, might have had less of an impact than anticipated because of the high baseline risk of depressive symptoms and suicide risk.

There are several limitations of this study. All subjects were recruited from a single health care system that serves mostly urban and low-income communities, which could limit generalizability. This study was not designed to determine test accuracy. Follow-up care was not standardized but instead was left to the discretion of the clinicians. Because of the range of presentation of depression and suicide risk and the potential treatment options, we were not able to evaluate fully the impact of a positive screen result beyond diagnoses and medication therapy. In addition, our data do not include subjects who received diagnosis and treatment outside of the Nationwide Children's Hospital health care system. Most patients who receive care within the primary care network receive mental health services within the primary care network, either from their primary care clinician, an integrated psychologist, or a social worker, or, depending on severity, the behavioral health services at Nationwide Children's Hospital. Although some families might choose to go outside of the system for care, this is unusual because of the limited resources in the community and the additional expense. Administrative claims can be incomplete for mental health symptoms that do not meet diagnostic criteria, and counseling and other nonpharmacologic therapy may not appear in administrative claims because they are often not covered.

The GLAD-PC provides an array of options for depression screening, ranging from targeting the most

TABLE 4 Diagnoses of Depression Self-harm or Antidepressant Prescription Within 6 Months of a Positive PHQ-9A Screen for Any Depression or for MDD or a Positive ASQ Result

	Positive PHQ-9A Screen Result		
	Any Depression (n = 205), %	MDD (n = 90), %	Positive ASQ Result (n = 75), %
Depression diagnosis	19.5	33.3	36.0
Self-harm diagnosis	2.4	1.1	5.3
Antidepressant prescription	6.3	12.2	13.3
Diagnosis or antidepressant prescription	22.9	35.6	42.7

affected individuals to those with depressive symptoms that might not reach criteria for MDD. Both the GLAD-PC and the USPSTF underscore the importance of having plans for follow-up after a positive screen result. Given the resource constraints in primary care, some might advocate to set the threshold on the basis of the ability to provide services (ie, screen for only MDD if follow-up services are limited). However, restricting to only the most severe cases might miss an important opportunity to improve health outcomes by targeting specific depressive symptoms to prevent the development of MDD or to implement an intervention for those with suicide risk detected only through depression or suicide-risk screening. As noted by the USPSTF, there is a critical research gap related to outcomes for interventions initiated within primary care for adolescents who are identified with depressive symptoms or suicide risk through screening.[21]

An advantage of using a standardized instrument like the PHQ-9A or ASQ is that the questions are assessed in a consistent manner with high fidelity and could be linked to in-office interventions to aid busy primary care clinicians. Although there is a large magnitude of positive scores, the tools might be less burdensome to practices if the screeners were not considered as a separate component added to the already busy adolescent preventive care visit but as a central activity that could be used to guide conversations and guidance around mental health, resiliency, and healthy behaviors. For example, the most common positive response to the PHQ-9A was related to trouble sleeping. Even in the absence of other depressive symptoms, this finding could lead to effective office-based interventions[22] that could decrease psychological distress and improve outcomes in other domains, such as school performance and positive engagement with peers. Although future research is needed to understand the impact of depression and suicide-risk screening, framing the PHQ-9A and ASQ as tools for adolescent health surveillance might be more helpful than considering only whether the screening result was positive or negative.

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ABBREVIATIONS

ASQ: Ask Suicide-Screening Questions
COVID-19: coronavirus disease 2019
GLAD-PC: Guidelines for Adolescent Depression in Primary Care
ICD-10: *International Classification of Diseases, 10th Revision*
MDD: major depressive disorder
PHQ-9A: Patient Health Questionnaire-9 Modified for Adolescents
USPSTF: US Preventive Services Task Force

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