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Mental Health Screening in Pediatric Practice: Factors Related to Positive Screens and the Contribution of Parental/Personal Concern

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ABSTRACT

OBJECTIVES. The goals were to examine factors related to positive Pediatric Symptom Checklist scores in an urban practice and to examine the relative contribution of parental/personal concern about emotional and behavioral problems to mental health problem identification.

METHODS. Annual screening using the Pediatric Symptom Checklist was implemented in Cambridge Pediatrics (Cambridge, MA). A social worker was colocated in the clinic to provide therapeutic interventions for patients. A sample of 1668 screened patients between 4 years 11 months and 19 years of age was used for analysis. Bivariate and multivariate analyses were conducted to determine factors predictive of positive Pediatric Symptom Checklist scores, including demographics, socioeconomic indicators, enrollment in counseling, and parental/personal concern. Parental/personal concern, counseling, and positive Pediatric Symptom Checklist scores were examined to determine their efficacy as screening methods.

RESULTS. Six percent of the population had positive Pediatric Symptom Checklist scores. There were statistically significant relationships between a positive score and being in counseling, parental/personal concern, having public insurance, and living in an area with median household incomes of less than \$50 000. Parental/personal concern was 40% sensitive for a positive score. A positive Pediatric Symptom Checklist score with or without parental/personal concern identified 3.8% of the population; parental/personal concern with or without a positive Pediatric Symptom Checklist score identified 4.5%.

CONCLUSIONS. Mental health screening can be effectively implemented in a pediatric practice. Colocated mental health professionals provide additional support. The combination of a screening tool and questions about parental/personal concern and present counseling can provide critical information about a child's mental health.

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Key Words

mental health, screening, Pediatric Symptom Checklist

Abbreviations

PSC—Pediatric Symptom Checklist
Y-PSC—Youth-Pediatric Symptom Checklist

OR—odds ratio

CI—confidence interval

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MORE THAN 1 of 10 children in the United States suffer from mental health problems that affect their lives.¹ However, behavioral health problems continue to go unrecognized, and only a minority of those in need receive services.^{2,3} In 1999, the Surgeon General called specifically on pediatricians to improve screening and referral for children's mental illness.⁴ More recently, the President's New Freedom Commission on Mental Health⁵ and the American Academy of Pediatrics recommended that pediatric providers screen patients for mental health issues as part of regular medical care.⁶ Early identification of mental health problems may lead to decreases in long-term disability rates.⁷ A visit to the pediatrician's office represents an opportunity for discussion of emotional issues with the child and the parent, but identification and referral rates continue to be low, relative to need,³ and frequently primary care providers underidentify mental health problems, especially in those without acute manifestations.^{1,8-11}

The many obstacles impinging on a pediatrician's ability to screen for mental health concerns include lack of time because of productivity requirements,⁸ lack of resources for referral,¹² lack of reimbursement for emotional health services,¹³ and lack of skills to manage mental health issues effectively.^{3,5} Although studies suggest that pediatricians have a strong interest in behavioral health, these problems have created significant obstacles to implementation of screening procedures.⁵

Standardized screening tools are available to support pediatric practice, to improve screening skills, and to provide efficient identification methods.^{10,14} The use of screening tools has been shown to be effective in increasing identification of psychosocial issues,^{15,16} but the incorporation of such tools into standard care remains challenging. Although studies have demonstrated the validity of such tools with diverse populations,¹⁷ less is known about whether the results of long-term screening justify the challenges inherent in implementation.

A number of studies have demonstrated that parental concern is an important component of early identification of emotional and behavioral issues. It has been shown to influence physician referral behaviors and to be closely related to psychiatric diagnoses.¹⁸⁻²¹ However, little is known about the correspondence between parental concern and general screening tools such as the Pediatric Symptom Checklist (PSC).²² This relationship merits additional investigation, particularly as the use of general screening tools becomes more prevalent.

In 2003, Cambridge Health Alliance began mental health screening with the PSC as part of the standard of care delivered by the department of pediatrics. The intent was to screen all school-aged children for mental health issues at their annual physical and to support pediatricians with available colocated mental health services. The project is now in its second year of implementation. Approval from the Cambridge Health Alliance

institutional review board was received on July 21, 2003. The requirement for informed consent for PSC screening was waived, whereas informed consent for those referred to the social worker intervention was obtained.

The study was designed to examine the outcomes of standardized mental health screening in pediatric practice. The goals were (1) to investigate factors related to positive screening in a multiethnic urban practice, (2) to examine the relationship between parental/personal concern about emotional problems and PSC scores, and (3) to determine whether PSC screening was efficient and effective.

METHODS

Setting

Cambridge, Massachusetts, is an urban city of >100 000 people.²³ The population is both ethnically and racially diverse, with people from ≥ 65 countries who speak >60 different languages. Cambridge is 68% white, 12% Asian, 12% black, 3% other races, and 5% ≥ 2 races. Seven percent of residents identify themselves as Hispanic, 9% of families live below the poverty level, and 13% of those families have related children <18 years of age.

Cambridge Pediatrics, a large outpatient practice of the Cambridge Health Alliance, was chosen as a pilot site for implementation. Cambridge Health Alliance is a public hospital system serving Cambridge and surrounding communities. Cambridge Pediatrics serves a diverse population, with a large proportion (>40%) covered by public payers, including Medicaid and the Uncompensated Care Pool (free care).²⁴ In 2004, the practice provided services to almost 5000 patients, with >14 800 visits. More than 36% of the population was <5 years of age. The 2004 racial distribution of patients was 48% white, 25% black, 8% Hispanic, 4% Asian, and 13% other.

Description of Project

In 2003, with funding from the Maternal and Child Health Bureau of the Health Resources Services Administration, Cambridge Pediatrics and Child Psychiatry began a pediatric mental health screening and intervention project. The goal of the project was to standardize mental health screening for all children who were seen for their annual physicals between 4 years 11 months (the fifth year annual physical) and 19 years of age and to refer any child in need, who was not already in counseling, to a colocated social worker for assessment and treatment.

A licensed, independent, clinical social worker supervised by the department of child psychiatry was colocated in the practice. This clinician was able to offer pediatricians an immediate referral source for families. After referral, she discussed the results of the PSC screen and conducted a thorough assessment of the patient, as

well as providing any addition referrals necessary, including those for psychopharmaceutical agents. As a member of the child psychiatry department, the social worker was able to bill directly for services as a provider of a licensed mental health facility. The child psychiatry and pediatric departments participated in the same insurance networks so that, except in the rare cases in which mental health insurance benefits differed from medical benefits, eligibility for services was equivalent.

The process for screening and referral followed a project flow process that was designed to ensure minimal demands on pediatricians' already limited time. It was conducted completely by already-present clinic staff members. The process included the following steps: parents filled out the PSC screen in the waiting room, primary care providers scored the tool in their examination rooms with the patient, and screening data were recorded in the electronic medical record. Children who scored positively and were not in counseling and children who scored negatively but whose parents or who themselves expressed concern about behavioral/emotional problems were referred to the social worker. If the providers thought it was necessary, then they could refer any child regardless of score, counseling status, or parental concern. This procedure was used whether or not

all responses on the PSC were completed. Providers were instructed to discuss the results of screening (positive or negative) and possible referral with the family. For those referred, a personal contact with the social worker was made if possible. Appointments could be made by patients at the reception desk, or the social worker would contact the patient within 3 days to offer an appointment (Fig 1). This protocol was used throughout the study period.

Screening With the PSC

The PSC and the Youth-PSC (Y-PSC)²⁵ were chosen as screening tools because of their established validity and utility.^{3,26,27} The PSC is a 35-item questionnaire that asks parents questions about their child's current behavioral and emotional concerns. Topics range from sleeping problems to feelings of sadness and anxiety. Items are rated as never, sometimes, or often present (scored as 0, 1, or 2, respectively).²⁶ Item scores are summed and, if scores fall above the cut-off point, then they are considered positive (scores considered positive were ≥ 24 for children ≤ 5 years of age, ≥ 28 for youth 6–16 years of age, and ≥ 30 for adolescents ≥ 17 years of age).²⁸ For research purposes, items that were left blank were scored as 0; however, if ≥ 4 items were left blank, then

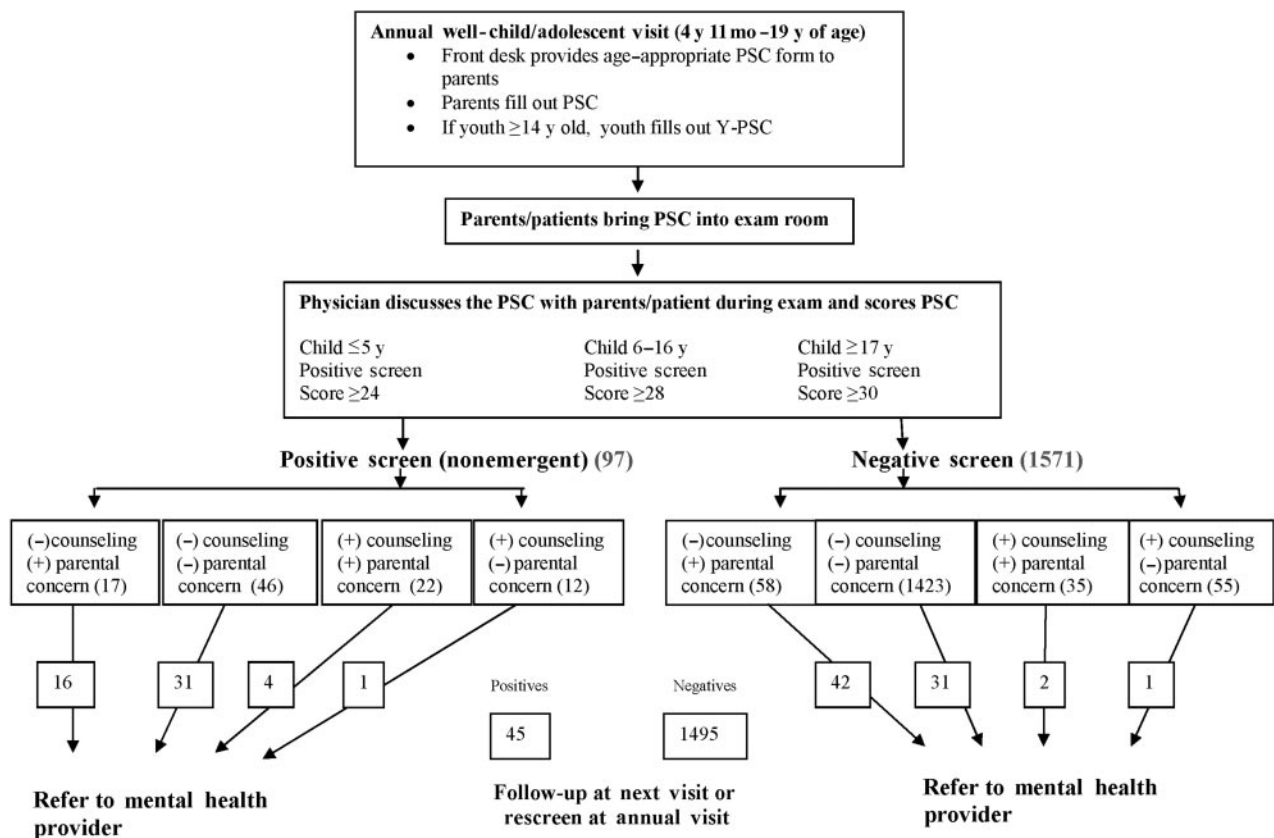


FIGURE 1
Process for pediatric screening and referral.

the questionnaire was considered invalid and excluded from analysis. The PSC has been translated into Spanish and used with economically disadvantaged and diverse populations and has been shown to have good reliability.^{3,28} To serve the needs of patients at Cambridge Pediatrics, the PSC was translated and back-translated into 4 additional languages, including Haitian Creole, Hindi, French, and Portuguese. Pilot testing was performed with appropriate linguistic groups.

Two questions were added to the PSC that were not included in the total PSC score. The first question was considered as a proxy for parental/personal concern, "Does your child have any emotional or behavioral problems for which she/he needs help?" (on the Y-PSC, "Do you have any emotional or behavioral problems for which you want help?"). A second question assessed current involvement in counseling, "Is your child currently seeing a mental health counselor?" (on the Y-PSC, "Are you currently seeing a mental health counselor?").

The PSC forms were provided, in triplicate, by registration staff members to parents on arrival for their child's annual appointments. Once completed, copies were available for the medical record, the research team, and the social worker if a referral was being made. In the month before implementation, researchers conducted pilot screening with 100 children seen for both acute and preventive visits. Ten percent of the population scored positively on the PSC. Of these, 3% were already in treatment with a mental health clinician. During this pilot phase, parents were asked whether they had any problems using the PSC. In general, families were happy that the practice had begun using a tool for mental health screening. No parents who were offered the PSC refused to fill it out.

Measures

PSC Data

For the purpose of this report, screening data collected from December 2003 until January 31, 2005, were used for analysis. All children who were seen for their annual physicals between 4 years 11 months (the fifth year annual physical) and 19 years of age were eligible for PSC screening and were included in the study.

Referral Data

Before colocation of the social worker, mental health referrals were made directly to child psychiatry services, on the basis of provider assessment. Throughout the project, providers continued to refer patients to child psychiatry services for non-PSC-screened cases and to the social worker for cases that came from PSC screening. These referrals were tracked before and during the project by using the child psychiatry referral Excel (Mi-

crosoft, Redmond, WA) database. Data on referrals and visits to the social worker were extracted from an Access (Microsoft) database maintained by the social worker for tracking purposes. In addition, data from the PSC forms were used to identify dispositions after visits.

Data from the PSC forms were merged with data on race, language, zip code, number of medical visits, and insurance type obtained from the MediTech hospital registration system (Medical Information Technology, Westwood, MA) in an Access database. Patient referral data, referral completion rates, and diagnosis at first visit were also included in the data set. The primary dependent variable of interest from the PSC data was the PSC score, which was recoded as a dichotomous variable (positive or negative) on the basis of validated scores for age group (scores considered positive were ≥ 24 for children ≤ 5 years of age, ≥ 28 for youth 6–16 years of age, and ≥ 30 for adolescents ≥ 17 years of age).²⁸ Raw PSC scores were used to calculate the least-squares adjusted means across the groups, controlling for possible confounding factors. The 2 questions that were added to the PSC had yes/no options. The first was renamed "parental/personal concern" and the second was renamed "counseling" for the purposes of analysis. Race was collapsed into 4 categories that represented the majority of patients (black, white, Hispanic, and other), whereas language was collapsed into 5 dominant languages (English, Spanish, Haitian Creole, Portuguese, and other). Because of small numbers, language was dichotomized into English and non-English variables for both the bivariate and multivariate analyses and race was dichotomized into white/nonwhite and black/nonblack variables for analysis of referral completion data. Age was collapsed into 4 categories that were thought to be developmentally appropriate (≤ 5 , 6–10, 11–14, and 15–19 years of age). Insurance was categorized as public (which included Medicaid, Medicaid health maintenance organizations, and the Uncompensated Care Pool), self-pay, or private (which included all private payers). Medical visits included all emergency department, ambulatory, inpatient, and subspecialty care but excluded psychiatric inpatient and outpatient visits. Data were extracted for 3 years before screening, to compare the history of health care utilization between the groups. The number of medical visits was treated as a continuous variable for analysis. Because there were no income data available, census-derived zip code socioeconomic data (median household income in the particular zip code) were used as a proxy for socioeconomic status. A dichotomous variable was constructed for those who lived in zip codes with median household incomes of less than \$50 000 or \$50 000 or more. Referral disposition was categorized as "initial assessment completed," "no response to telephone or letter contact," or "refused counseling."

Analysis

To assess the relationship between positive PSC scores and other factors, bivariate analyses were conducted with a series of demographic variables, including age, gender, geo-socioeconomic status, insurance status, responses to the additional questions on the PSC form, and previous use of medical services. χ^2 and Fisher's exact tests were performed, and *P* values and odds ratios (OR) with 95% confidence intervals (CIs) were calculated for bivariate analyses of categorical variables, including those that assessed the effect of missing race data.

A multivariate logistic regression analysis was conducted to determine which factors were predictive of a positive PSC score. All variables that were related significantly to PSC scores in bivariate analyses, including socioeconomic indicators, enrollment in counseling, parental/personal concern of a problem, and number of medical visits, were included in the model while controlling for race, age, language, and gender. All variables were treated as dichotomous with the exception of medical visits, which was treated as a continuous variable. The model was shown to have good fit (Hosmer-Lemeshow goodness-of-fit test: *P* = .916, *c* = 0.805). ORs were calculated from the regression coefficients by exponentiation and are presented with 95% CIs. To address the potential effect of missing responses on the positive classification of PSC scores, we performed ad hoc sensitivity analyses on invalid PSC screens by first classifying all missing items as always (maximal scores) and then classifying all missing items as never (minimal scores). In each scenario, we reestimated the associations of the independent variables of interest with the positive classification of the PSC score in logistic regression analysis, to compare the 2 sets of results. The *c*-statistics for the 2 models were similar (0.811 when based on the minimal score and 0.766 when based on the maximal score). Sensitivity and specificity percentages for a positive PSC were also calculated for various identification methods, including parental/personal concern, current counseling, and combinations of these.

We examined the number of referrals made to the colocated social worker as a result of PSC screening. This number plus the number of referrals made to child psychiatry services during the same time period was compared with the number of documented referrals to child psychiatry services in the previous year, to determine changes over time. To assess the relationship between appointment completions and other factors, bivariate analyses were conducted with a series of demographic variables, including age, gender, geo-socioeconomic status, and insurance status, PSC scores, responses to the additional questions on the PSC form, and previous use of medical services. χ^2 and Fisher's exact tests were performed and *P* values were calculated. All statistical analyses were conducted with SAS 9.1 (SAS Institute, Cary, NC).

RESULTS

Of the 2151 patients who were eligible to receive screening at their annual visit during the project period, 1819 (85%) were screened between December 2003 and January 31, 2005. Although no parents were documented as refusing to complete the form, reasons for missing screens included loss of forms, low literacy levels of parents completing forms, developmental delay or low cognitive ability, and language barriers. Eighty screens were deemed invalid because of missing responses (4%).

Because of missing race data in the hospital MediTech system, an additional 71 patients were eliminated from analysis, leaving the total sample for analysis at 1668. Those with unknown race were compared with the rest of the population and were found to be more likely to be English speakers (*P* = .01), to live in zip codes with higher median incomes (*P* = .01), and to be in the 6- to 10-year age group (*P* = .01), but they did not differ significantly in the major outcome variables, including PSC scores, parental/personal concern, and desire for counseling.

Demographic features of the final sample are shown in Table 1. There were slightly more female subjects than male subjects in the sample. Six percent of the population screened scored above the positive age-specific cutoff point on the PSC. Sixty-eight percent of the 14- to 19-year-old population completed a Y-PSC, and 8% of them scored positively on the PSC (data not shown). Seven percent of the total population was already seeing a mental health counselor. Eight percent self-reported or their parents reported that the child had emotional or behavioral problems for which she or he needed help. A greater proportion of the sample population had private insurance (56% vs 38%), and there were more children who lived in zip codes with median household incomes of less than \$50 000 compared to those who lived in households with incomes of more than \$50 000 (56% vs 44%).

Results from bivariate analyses are shown in Table 2. There were statistically significant differences according to race, with black subjects being slightly more likely to score positively than other groups. Children with negative PSC scores had significantly lower mean numbers of medical visits in the previous 3 years, compared with those with positive PSC scores. Children receiving public insurance were more likely to have positive scores than were those who were self-pay or privately insured (9% vs 3% and 4%, respectively; *P* < .0001), as were those living in zip codes with median household incomes of less than \$50 000 (7% vs 4%; *P* < .01). To determine the relationship between race and language and socioeconomic indicators, additional bivariate analyses were conducted. Race was found to be associated with both economic indicators, with nonwhite subjects being more likely to have public insurance (49% vs 26%; *P* < .001) and being more likely to reside in zip

TABLE 1 Characteristics of PSC-Screened Patients (*n* = 1668)

Age, <i>n</i> (%)	
≤5 y	150 (9)
6–10 y	561 (34)
11–14 y	495 (30)
15–19 y	462 (28)
Gender, <i>n</i> (%)	
Male	786 (47)
Female	882 (53)
Race, <i>n</i> (%)	
White	814 (49)
Black	506 (30)
Hispanic	121 (7)
Other	227 (14)
Language, <i>n</i> (%)	
English	1237 (74)
Haitian Creole	150 (9)
Spanish	80 (5)
Portuguese	100 (6)
Other	101 (6)
Insurance, <i>n</i> (%)	
Private	930 (56)
Public	628 (38)
Self-pay	110 (7)
Census-derived median household income, <i>n</i> (%)	
<\$50 000	939 (56)
≥\$50 000	729 (44)
PSC score, <i>n</i> (%)	
Positive	97 (6)
Negative	1571 (94)
Currently seeing a mental health counselor, <i>n</i> (%)	
Yes	124 (7)
No	1544 (93)
Parental/personal concern about emotional problems, <i>n</i> (%)	
Yes	132 (8)
No	1536 (92)
No. of medical visits in past 3 y, mean ± SD	9.55 ± 7.39

codes with median household incomes of less than \$50 000 (62% vs 50%; $P < .001$), compared with white subjects (data not shown).

Children who were already receiving counseling were more likely to score positively on the PSC, compared with those who were not (27% vs 4%; $P < .0001$), as were children with parental/personal concern about emotional or behavioral problems, compared with those without (30% vs 4%; $P < .0001$). However, >70% of children who were in counseling and 70% of those with parental/personal concern did not score positively on the PSC.

In the multivariate logistic regression analysis, being in counseling, having parental/personal concern about emotional or behavioral problems, living in an area with median incomes of less than \$50 000, and having public insurance were all statistically significantly associated with positive PSC scores (Table 3), even after controlling for gender, race, language spoken at home, and age.

As described above, a sensitivity analysis was performed on invalid screens. Data from 73 complete records (8 records had missing data for key variables)

were used in the estimation of 2 multivariate logistic regression models, a minimal score model and a maximal score model. The direction and general magnitude of the ORs were similar for the 2 models, although several differences were worth noting. For example, the maximal score model resulted in an OR of 1.85 (95% CI: 1.19–2.88) for black subjects, relative to white subjects, compared with an OR of 1.42 (95% CI: 0.86–2.34) when the minimal score was substituted. In addition, subjects with public insurance, compared with those with private insurance, had an OR of 1.45 (95% CI: 0.98–2.15) with the maximal score model, compared with an OR of 1.65 (95% CI: 1.03–2.64) with the minimal score model. None of the results changed direction or changed magnitude substantially; therefore, the results of this analysis confirmed those found in our main analysis (Table 3).

By using PSC scores as a continuous variable, we calculated the least-square adjusted means across the groups, controlling for age, income, and insurance. Portuguese speakers had a somewhat higher mean PSC score (mean: 13.91; 95% CI: 12.16–15.66) than did any other language group (data not shown).

We also tested various combinations of parental/personal concern and counseling, to determine the most sensitive and specific combination for positive PSC scores (Table 4). Parental/personal concern was 40% sensitive for a positive PSC score and 94% specific, the positive predictive value was 30%, and the negative predictive value was 96%. Having parental/personal concern and/or being in counseling proved most sensitive for a positive PSC score (53%). To determine the contribution of each identification method, we assessed percentages alone and in combination with other methods (positive PSC score, pediatrician referral alone, parental/personal concern, and current counseling). Identification rates are shown in Table 4. Although parental/personal concern alone identified the most children (3.5%), all methods combined identified 16.5% of children.

As a result of PSC screening, 128 new referrals to the social worker were made (Fig 1). There were also 98 referrals to child psychiatry services during this time. Therefore, the total number of mental health referrals made by this practice represented an increase of almost 100% from referrals in the previous year (114 in 2003 and 226 in 2004). Of the 128 children referred, 41% had positive PSC scores and 59% had negative PSC scores. Six percent of those referred were already in counseling. Follow-up data were available for 109 children (85%). Only 17% of these children (19 children) made it to an initial appointment, whereas 66% did not respond to a telephone call or letter and 16% refused services. Race was related significantly to appointment completion ($P = .008$), with those in the white race/ethnicity group being most likely to complete appoint-

TABLE 2 Prevalence of Sociodemographic Risk Factors Among Patients Who Scored Positive With the PSC

Risk Factor	No. Screened Positive With PSC (n = 97)	Proportion Positive Within Risk Factor, %	OR (95% CI)	No. of Medical Visits in Previous 3 y, Mean (95% CI) ^c
Age, y				
≤5	8	5	1.00 (reference)	
6–10	32	6	0.97 (0.63–1.50)	
11–14	22	4	0.68 (0.42–1.11)	
15–19	35	8	1.51 (0.98–2.32)	
Gender				
Female	49	6	1.00 (reference)	
Male	48	6	1.11 (0.73–1.67)	
Race				
White	43	5	1.00 (reference)	
Black	43	9	1.91 (1.26–2.89) ^a	
Hispanic	4	3	0.53 (0.19–1.48)	
Other	7	3	0.48 (0.22–1.04)	
Language				
English	71	6	0.95 (0.60–1.51)	
Non-English	26	6	1.00 (reference)	
Census-derived median household income groups				
<\$50 000	68	7	1.88 (1.21–2.94) ^a	
≥\$50 000	29	4	1.00 (reference)	
Insurance				
Private	39	4	1.00 (reference)	
Public	55	9	2.28 (1.51–3.45) ^b	
Self-pay	3	3	0.44 (0.14–1.40)	
Currently seeing a mental health counselor				
Yes	34	27	8.88 (5.56–14.18) ^b	
No	63	4	1.00 (reference)	
Parental/personal concern about emotional problems				
Yes	39	30	10.69 (6.77–16.87) ^b	
No	58	4	1.00 (reference)	
Screening Result				
Screened positive with PSC (n = 97)				11.43 (9.95–12.91)
Screened negative with PSC (n = 1571)				9.75 (9.3–10.16)

^aP < .01.

^bP < .0001.

^cP < .05.

ments ($P = .0018$) and those with black race/ethnicity being least likely to complete appointments ($P = .0007$), compared with those who were nonwhite or nonblack. In addition, having a positive PSC score and having parental/personal concern were related significantly to referral completion ($P = .0111$). No other variables examined, including PSC scores, were related significantly to referral completion.

DISCUSSION

General Findings

Adopting a change in practice requires physician commitment as well as patient acceptance. Although screening for mental health in pediatric care is recommended, the evidence base is not considered strong.^{29,30} Therefore, establishing the value of screening in individual practices is important. In our study, the results of the PSC screen-

ing, including significant correlates and predictors of positive scores, were shared regularly with pediatric providers and provided compelling evidence for sustainability.

Only 6% of the patients seen in Cambridge Pediatrics were identified by the PSC as having mental health issues. This stands in contrast to PSC studies in other localities that demonstrated rates of 12% to 14%.^{1,25,27} There are several explanations for this difference. First, geographic disparities in children's mental health care are known to exist. Massachusetts was shown to have an estimated need for mental health services below the national average at 7.1%,² which was not explained by racial or ethnic differences but was thought to be related to state policies and market characteristics. Second, the high percentage of new immigrants in the practice might be a factor. It is possible that the PSC had lower sensi-

TABLE 3 Multivariate Logistic-Regression Model Predicting Positive Scores Among PSC-Screened Children (*n* = 1668)

Risk Factors	OR (95% CI)
Age, y	
≤5	1.00
6–10	0.76 (0.32–1.83)
11–14	0.59 (0.24–1.47)
15–19	1.14 (0.48–2.68)
Gender	
Female	1.00
Male	0.93 (0.59–1.47)
Race	
White	1.00
Black	1.57 (0.94–2.61)
Hispanic	0.41 (0.13–1.33)
Other	0.56 (0.24–1.33)
Language	
Non-English	1.00
English	0.70 (0.41–1.20)
Census-derived median household income groups	
≥\$50 000	1.00
<\$50 000	1.65 (1.01–2.69) ^a
Insurance	
Private	1.00
Public	1.78 (1.10–2.87) ^a
Self-pay	0.50 (0.14–1.84)
Currently seeing a mental health counselor	
No	1.00
Yes	4.30 (2.39–7.74) ^b
Parental/personal concern about emotional problems	
No	1.00
Yes	6.22 (3.54–10.92) ^b
No. of medical visits in past 3 y	1.01 (0.98–1.04)

Model *c*-statistic = 0.805; Hosmer-Lemeshow goodness-of-fit test: *P* = .916.

^a *P* < .05.

^b *P* < .0001.

tivity than expected with this population, consistent with the work of Jutte et al³¹ with Mexican American subjects. Jutte et al³¹ noted that the inherent resiliency of an immigrant population may affect both perceptions of mental health and reporting. In addition, other researchers found that white subjects reported higher rates of mental health problems, compared with other ethnic groups, which indicates that cultural perceptions play a role in the reporting of symptoms.³²

Third, the type of visit might contribute to the rate of positive scores. We noted that, during our pilot phase, when we included both acute and annual visits, the rate of positive scores increased to 10%. Borowsky et al³³ reported similar findings, noting that the rate of mental health issue identification in acute visits was almost double that of annual visits. Acute visits may be more likely to represent crises in a child's life, whereas families may not have particular complaints at annual visits. Additional research is needed to determine the factors contributing to differences in visit type, as well as geographic differences and the effects of race and immigration on rates of identification of mental health issues.

The relationship of race and positive scores is an

interesting one. We found significant differences in positive scores according to race, with black subjects being somewhat more likely to score positively than other groups. Significant differences in mean PSC scores were also found, with Portuguese speakers having higher mean scores than other groups. We have not identified other studies that demonstrated significant differences in PSC scores according to race. In our study, however, nonwhite subjects were significantly more likely to have public insurance and to live in areas of lower household income than were white subjects. Although race and socioeconomic indicators (insurance status and zip code-derived household income) were significant predictors of a positive PSC score in the bivariate analyses, only socioeconomic indicators were significant in the multivariate analysis, which suggests that race results may be attributable to a poverty effect. Those living in areas with lower median incomes and those with public insurance were almost twice as likely to have positive scores as were those living in areas with higher median incomes and those with private insurance. The significant relationship between scores and the proxies for economic status used in this study echoes information found in previous studies.^{1,3,34} Although the relationship of poverty to mental health problems has been well established, larger samples and additional research are needed for an understanding of the interactions between the variables of race, language, and insurance status. In addition, it would be interesting to examine the sensitivity and specificity of the PSC in different racial/ethnic groups.

Counseling and Parental/Personal Concerns

As in previous studies, being in counseling was predictive of a positive PSC score. The current study noted a fourfold increase in risk for a positive PSC score if a child was currently receiving counseling. Although other studies found similar relationships between a history of therapy and PSC scores,¹ we did not encounter any that examined current therapy specifically. It is interesting to note that, although being in counseling was a predictor of positive PSC scores, the majority of children who were in counseling did not score positively on the PSC. One might hypothesize that counseling improves symptoms and contributes to lower subsequent PSC scores. We intend to explore this issue more thoroughly as we monitor children over time.

Parental/personal reports of child emotional and behavioral issues were strongly predictive of positive PSC scores. Children who identified themselves or whose parents identified them as having an emotional or behavioral problem were 6 times more likely to score positively on the PSC. Parental concern about psychosocial functioning has been shown to be a sensitive predictor of true psychiatric disorders.¹⁸ It has also been shown to improve physicians' identification of and sub-

TABLE 4 Sensitivity and Specificity of Various Methods Used to Detect Children in Need

Indicated Response	Sensitivity, %	Specificity, %	Proportion of Respondents Identified by Indicated Method, %
Parental/personal concern positive	40	94	
Counseling positive	35	94	
Parental/personal concern positive and counseling positive	23	98	
Parental/personal concern positive or counseling positive or both positive	53	91	
PSC positive alone, others negative			2.8
Counseling positive alone, others negative			3.3
Parental/personal concern positive alone, others negative			3.5
PSC positive and counseling positive but parental/personal concern negative			0.7
PSC positive and parental/personal concern positive but counseling negative			1.0
PSC positive, counseling positive, and parental/personal concern positive			1.3
Counseling positive and parental/personal concern positive but PSC negative			2.1
All 3 negative but pediatrician referred anyway			1.8
All methods			16.5

sequent behavior with respect to children's mental health issues.^{35,36} In this study, although parental/personal concern was only moderately sensitive for a positive PSC score, it was highly specific. Parental/personal concern alone identified another 3.5% of children, beyond those identified with the PSC tool. Glascoe et al³⁷ reported that young children who did not score positively on screening tools but whose parents expressed concerns still had high levels of behavior problems. Although parents and teens may overidentify mental health issues, expressed concerns should lead to additional evaluation regardless of PSC score. Of note, however, is the finding that the individual methods alone (parental/personal concern, counseling, and PSC scores) did not identify all of the same children. The combination of inquiry about parental/personal concern, current counseling, positive PSC score, and provider decision identified the most children (16.5%) in need, which suggests that multiple modalities are important for office practice.

As noted in other studies,^{11,38-40} colocated mental health resources greatly improved providers' ability to access services and thus support the incorporation of screening into practices. The convenience of readily available mental health providers might have had a great deal to do with the pediatricians' willingness to incorporate screening. To determine the impact of colocation on implementation, additional study is needed.

Despite on-site services, referral completion rates remained low in this study. This has been documented in other studies, particularly for newly identified children.^{41,42} We know that patients with more impairment and identified mental health needs are more likely to access services,^{43,44} but the impact of colocated services

on service utilization for patients identified in preventive visits has yet to be established. When children are identified at annual visits, generally they are not presenting with mental health complaints. Screening provides a structured prompt for discussion but may not provide the impetus for follow-through. Discussion alone may be a therapeutic intervention by itself and, although many referred children and families may not access mental health services, they do have the opportunity to talk about their concerns with their physician.

For patients who did attend mental health appointments, only race (white) was associated with completion. Parental/personal concern was associated significantly with referral completion only for patients with positive PSC scores. Both parental concern and race were shown to be predictors of service utilization in other studies.⁴³⁻⁴⁶ There is much work to be done in this area, and future studies are needed to improve referral completion rates and to allow better understanding of the impact of screening on mental health concerns. In addition, examining what happens after referral, particularly for children with previously unidentified mental health issues, would be of great interest.

In our study, as a result of the introduction of screening along with counseling and concern questions, 276 children were identified at their annual visits as having mental health needs and 128 of them were referred to mental health services. This was a significant increase in referrals, compared with the previous year. It is evident that the incorporation of a standardized screening tool into pediatric practice heightened awareness of mental health and, along with parental/personal concern and counseling questions, increased pediatricians' ability to identify children with mental health needs.

Limitations

This study took place in one diverse urban pediatric practice and therefore may be limited in its generalizability to other pediatric settings and communities. The PSC analysis was limited by the lack of data on other variables that might have contributed to the findings, including life events, parental mental health issues, income, and family status. The size of our sample did not allow for subset analysis on the basis of ethnic groups and/or language groups. In addition, because we were not able to identify country of origin or date of immigration, we were not able to determine the contributions of those factors to the findings.

Because we did not have concurrent data on mental health assessments for patients with positive screens, we were not able to determine the sensitivity and specificity of the PSC in our population. Although we were able to report some results of referrals, the small sample size limited our analyses. In addition, we did not have specific information on all aspects of the referral process, including the time between the visit and the telephone call, the wait time for an appointment, and the reason for refusal. We are planning a study to determine reasons for refusal among patients referred to social workers by primary care providers.

Finally, the study used a cross-sectional design and does not offer insight into the stability of PSC scores over time. A longer-term follow-up study in which PSC scores are monitored would be helpful.

CONCLUSIONS

Identification of and prompt response to children's mental health issues should be expected parts of pediatric care. Despite challenges, incorporation of screening into pediatric practices is a feasible and attainable goal. Colocated mental health professionals provide additional and needed support to pediatric providers. The screening tool is only one component in mental health issue identification. We found parental/personal concerns and current counseling to be important factors for identification that were complementary to use of the PSC. Therefore, we recommend using a combination of questions about parental/personal concern and counseling and standardized assessment. This strategy, along with provider acumen and multispecialty practices, represents a comprehensive approach to incorporating mental health into pediatric practice.

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Mental Health Screening in Pediatric Practice: Factors Related to Positive Screens and the Contribution of Parental/Personal Concern
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