Published in final edited form as:

Child Health Care. 2016 ; 45(3): 241–265. doi:10.1080/02739615.2014.948160.

School-based Screening to Identify Children At Risk for Attention-Deficit/Hyperactivity Disorder: Barriers and Implications

Tammy D. Barry,

The University of Southern Mississippi, Hattiesburg, MS

Raymond A. Sturner,

Johns Hopkins University School of Medicine, Baltimore, MD

Karen Seymour,

Johns Hopkins University Children's Center, Baltimore, MD

Barbara H. Howard,

Johns Hopkins University School of Medicine, Baltimore, MD

Lucy McGoron,

University of Delaware, Newark, DE

Paul Bergmann,

Syncretix, St. Paul, MN

Ronald Kent,

Hattiesburg Clinic/Connections, Hattiesburg, MS

Casey Sullivan,

The University of Southern Mississippi, Hattiesburg, MS

Theodore S. Tomeny,

The University of Southern Mississippi, Hattiesburg, MS

Jessica S. Pierce,

The University of Southern Mississippi, Hattiesburg, MS

Kristen L. Coin,

The University of Southern Mississippi, Hattiesburg, MS

James K. Goodlad, and

The University of Southern Mississippi, Hattiesburg, MS

Nichole Werle

The University of Southern Mississippi, Hattiesburg, MS

Abstract

This report describes a school-based screening project to improve early identification of children at risk for attention-deficit/hyperactivity disorder (ADHD) and communicate these concerns to parents, recommending that they contact their child's primary care provider (PCP). Of 17,440 eligible children in first through fifth grades in five school districts, 47.0% of parents provided

required written consent, and teachers completed 70.4% of the online screeners (using the Vanderbilt AD/HD Diagnostic Teacher Rating Scale). Of 5,772 screeners completed, 18.1% of children ($n = 1,044$) were identified as at risk. Parents of at-risk children were contacted to explain risk status and recommended to visit their child's PCP for further evaluation. It was not possible to contact 39.1% of parents of at-risk children. Of the 636 parents of at-risk children who could be contacted, 53.1% ($n = 338$) verbally accepted the recommendation to follow-up with their PCP, which was not related to ADHD symptom severity. Parents of children with IEPs or related services were more likely to accept the recommendation to visit the PCP. Our exploration of the potential for school-based screening for ADHD identified a number of barriers to successful execution, but the data also indicated that this is an important problem to address.

Keywords

Attention-deficit/hyperactivity disorder; mental health screening; school-based screening; barriers

Introduction

Attention-deficit/hyperactivity disorder (ADHD)—a behavioral disorder involving a persistent pattern of developmentally inappropriate levels of inattention, hyperactivity, and impulsivity accompanied by impairment in multiple settings—is one of the most common childhood mental health disorders (American Psychiatric Association, 2013). Around 8% of school-aged children meet diagnostic criteria (Centers for Disease Control and Prevention, 2010), and prevalence rates are as high as 10% in community samples (Getahun et al., 2013; Larson, Russ, Kahn, & Halfon, 2011; Merikangas et al., 2010). Children with ADHD have significant impairment, often including academic underachievement and school failure, poor peer relations, and negative parent-child interactions, utilize significant school services, and are at increased risk for later substance use, teen pregnancy, and criminality, among other negative outcomes (American Psychiatric Association, 2013; Wilens, Biederman, & Spencer, 2002).

Fortunately, early identification and treatment of ADHD can significantly reduce rates of some of these poor outcomes. The frontline professionals in the evaluation and treatment of ADHD are usually primary care physicians (PCPs), including pediatricians (Epstein et al., 2011), making it imperative that PCPs have the clinical data to make informed decisions for diagnosis and management (Epstein, Langberg, Lichtenstein, Kolb, & Stark, 2010). Teacher observations are key to early and accurate identification of ADHD (Bhatara, Vogt, Patrick, Doniparthi, & Ellis, 2006) and, per American Academy of Pediatrics (AAP, 2011) guidelines, also for ongoing clinical care. It is critical that PCPs, teachers, and parents share information to optimize care for children with ADHD, but the focus of reports have been on communication from a PCP caring for a child with ADHD initiating communication with the child's teacher after the parent has brought the child in for treatment. However, teachers are dealing with challenging ADHD-type behaviors among children every day who may or may not have an established medical diagnosis or have symptoms that have come to the attention of professionals outside of the school—and more research needs to explore how to screen children in the schools and subsequently improve communication between teachers,

parents, and PCPs (Wolraich, Bickman, Lambert, Simmons, & Doffing, 2005). This study explores the feasibility of opening communication with PCPs about children at risk for ADHD, specifically by communicating risk status to parents of children identified through school-based screening and recommending that they visit their child's PCP to share the screening results.

Evidence-based Assessment and Monitoring of ADHD in Children: Importance of Teacher Data

Diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) diagnostic criteria for ADHD specify that symptoms and impairment must be demonstrated in at least two settings and prior to the age of 12 years (American Psychiatric Association, 2013). Teacher ratings serve as a second source and setting to parent report and are an invaluable summary of accumulated observations in the context of an academic, task-oriented setting by individuals who are familiar with developmental expectations (Sax & Kautz, 2003; Wolraich et al., 2005). Teachers are often the first to identify that a child has difficulties consistent with ADHD (Sax & Kautz, 2003), and teacher ratings of ADHD have demonstrated reliability and validity (Wolraich, 2002). Utilization of both parent *and* teacher ratings of child behavior in the diagnosis of ADHD is a basic component of the American Academy of Pediatrics guidelines (AAP, 2011).

Importantly, a large multicenter study showed that when clinicians had monthly teacher input to guide medication dosing, more than twice as many children with ADHD became “normalized” by symptom count compared to children treated with the same medication in the community without special access to these data (Jensen et al., 2001). Nevertheless, most PCPs report that the process of obtaining school information is difficult, and they only infrequently do so (Chan, Hopkins, Perrin, Herrerias, & Homer, 2005). Indeed, too often, parents are the only providers of information to PCPs (Wolraich, 2005). However, since PCPs are most likely to treat children with ADHD (Epstein et al., 2010; Epstein et al., 2011), improving the frequency, consistency, and quality of communication between parent, teachers, and PCPs is essential to providing optimal care. One approach that has been shown to facilitate parent-teacher-PCP communication is use of a web-based system for data collection and access (Epstein et al., 2011; Epstein, 2012). Such a system can also be used for school-based screening for at-risk children.

School-based Screening for ADHD Risk

School-based screening—particularly when facilitated by a web-based system to efficiently collect and score the screeners, making the information immediately available—has the potential to overcome the school-to-PCP communication barrier, uses the key teacher data needed for the referral, and may provide earlier identification of children at risk than parent-initiated assessment (Epstein et al., 2011; Epstein, 2012; Parr, Ward, & Inman, 2003). Because school-based screening can lead to earlier intervention for at-risk children, it could possibly change the trajectory of problems before symptomatic behaviors become too entrenched (Barbarese, Katusic, Colligan, Weaver, & Jacobsen, 2007). School-based screening results could be used to motivate parents to communicate with their child's PCP about their child's risk for ADHD and to seek out further assessment. Furthermore, for

children eventually identified with ADHD, teacher ratings that are completed online can be routinely accessible to the PCP, allowing critical school data to be available at the time of a clinical visit rather than requiring a return visit, which may be months later.

School-based screening to identify children at risk for ADHD can be of great benefit in initiating services for these children. Indeed, youth identified as *at risk* according to teacher-report on ADHD screening measures (e.g., scores above an empirically-based clinical cut-point consistent with DSM-5 criteria; American Psychiatric Association, 2013) demonstrate increased academic and behavioral problems and disorders, higher rates of school retention, suspension, and expulsion than control youth, and often meet full diagnostic criteria for ADHD when assessed by clinicians (Bussing, Mason, Bell, Porter, & Garvan, 2010; Rohde et al., 1999; Wolraich, Bard, Neas, Doffing, & Beck, 2013). It is important to note, however, that a multi-method clinical diagnostic assessment with actual observations of the child, testing to rule out co-existing learning or emotional difficulties or sensory impairments, as well as interview data from the family is needed to make a formal diagnosis. Therefore, the standardized teacher ratings capturing specific DSM criteria that establish an “at risk” status do not provide a true count of children with ADHD. Nevertheless, such screeners can provide information about which children should be further evaluated to determine if they meet criteria for ADHD. Parents of at-risk children can then be informed of the results, and a recommendation that the parents follow-up with their child’s PCP can be made. Thus, such a screening procedure could be the first step in improving identification of and communication about at-risk children.

Attempting to Improve Communication about Children At Risk for ADHD

In a large-scale study, Wolraich et al. examined whether educating teachers and PCPs in workshops or person-to-person would improve parent-teacher-PCP communication in the care for children with ADHD (Wolraich et al., 2005). The study showed few significant improvements in communication and those were not sustained over time. The authors call for more research to improve parent-teacher-PCP communication through other efforts (Wolraich et al., 2005). They point out the gap in knowledge as to what specific methods would actually increase this important communication.

The current report addresses this knowledge gap using a different method to foster parent-teacher-PCP communication, in this case using an electronic screening and communication system that can be sustained over time. Specifically, we report on the use of a *school initiated* web-based data collection process, similar to the one reported by Epstein et al. (2011) which was initiated by PCPs, with the additional goal of conducting school-based screening by teachers as well as project staff communication with parents of at-risk children to recommend that they contact their PCP. This system can offer other advantages, such as providing teacher ratings in advance of physician-initiated requests for patients already being evaluated or treated for ADHD as well as giving teachers of children with classroom difficulties a standardized way of communicating their concerns with parents and doctors if an assessment is desired by the parent. Specifically, this report describes the process and descriptive outcomes of initiating school-based screening procedures, identifying at-risk children, obtaining additional data about children’s school-based services/outcomes,

communicating the child's risk to parents of identified children, and recommending that the parents follow-up with their child's PCP.

Method

Participants

Forty schools within five school districts located in the central and southern regions of the state of Mississippi participated in this screening project. The five school districts represented a diverse group of students, with percentage of White students ranging from 9.1% to 74.6% and percentage of free/reduced lunch ranging from 27.7% to 68.2% across the five districts. Within the five participating school districts, there were 17,440 children in the first through fifth grade eligible for screening and 5,772 children actually screened following active parent consent for screeners as well as teacher completion of screeners.

The primary focus of the described project is the 1,044 children identified as at-risk for a diagnosis of ADHD based on teacher screening. These children were an average of 8.68 years old ($SD = 1.58$), with 66.4% male and 33.6% female. Child age was missing for 14 children. Information on race (64.1% White, 31.7% Black, 1.8% Hispanic/Latino, 0.9% Asian, 0.5% Native American, 0.2% Native Hawaiian, 0.9% not reported; coded White = 1 and race other than White = 0) and free/reduced lunch (37.1%; representing low socioeconomic status; coded 1 = yes and no = 0) was collected in the subsequent spring for 568 children (54.4% of the total sample) and is considered to be representative of the entire sample as it was drawn from all five school districts (with data from each school district available for a range of 32.6 to 73.2% of students). Specifically, percentages for the demographic variables for the available sample (examined by district) are descriptively similar to those for the district from which the sample was drawn (see Table 1). Thus, it appears that the students for whom consent to screen were obtained were generally demographically similar to all students in the respective district on these two variables.

Measures

Vanderbilt AD/HD Diagnostic Teacher Rating Scale (VADTRS)—The VADTRS consists of 43 items measuring clinical symptoms including ADHD symptoms, other emotional and behavioral symptoms, and impairment items. Specifically, the ratings for ADHD include a comprehensive list of the 18 diagnostic symptoms of the disorder derived directly from the DSM, which are measured on a 4-point Likert scale (with responses ranging from 0-*Never* to 4-*Very Often*; Wolraich et al., 2013). The VADTRS also measures impairment in academic performance and classroom behavior on a scale from 1-*Excellent* to 5-*Problematic*. Data from the other emotional, behavioral, and academic items were used in supplementary analyses and to inform the parent of potential impact during the interviews that are described below.

The VADTRS demonstrates excellent psychometric properties, including in community samples, and is recommended and distributed by the AAP for the assessment of ADHD and associated comorbidities (Wolraich et al., 2013). The 18 ADHD items yielded good internal consistency ($\alpha = .85$) in the current sample.

Based on teacher screener alone (not confirmed diagnosis), children were classified as ADHD–Inattentive presentation, ADHD–Hyperactive/Impulsive presentation, ADHD–Combined presentation, or not meeting diagnostic criteria for any form of ADHD using standardized scoring for the VADTRS. Specifically, having at least 6 out of 9 inattention items or hyperactive/impulsive items endorsed as *often* or *very often* and at least one impairment item endorsed as *somewhat of a problem* or *problematic* led to classification of ADHD–Inattentive presentation or ADHD–Hyperactive/Impulsive presentation. Children were classified as ADHD–Combined presentation when both the inattentive and hyperactive/impulsive criteria were met. A total ADHD symptoms score was also computed by summing all 18 ADHD symptom items; possible total scores ranged from 0 to 54.

School Intervention Questionnaire (SIQ)—The SIQ was used to assess factors that may relate to risk status, including receiving school intervention services and/or disciplinary actions (Bergmann, Howard, & Sturner, 2010). The SIQ was developed for this project modeled after an interview instrument used in a national study of developmental services provided for children in the United States (Chambers, Shkolnik, & Perez, 2013). Teachers indicated whether children had received (yes or no) various school interventions or disciplinary referrals during the current academic year. Based on these item-level responses, an *intervention composite* was coded as 0 or 1, with 1 indicating the child received at least one service requiring an individualized education plan (IEP; i.e., speech language services, occupational therapy, physical therapy, special education, emotional/behaviorally disordered services, or assigned teacher’s aide). A second *intervention composite* was coded similarly to indicate delivery of at least one other school service that would not necessarily require an IEP, including counseling services, social skills group, conflict resolution intervention, tutoring, or preferential seating. A *disciplinary referrals composite* was coded 0 or 1, with 1 indicating that the child had received at least one disciplinary referral (i.e., office referral, in-school suspension, out-of-school suspension, other disciplinary action). Finally, the SIQ measured whether the child had an IEP, a Section 504 plan, or psychological/educational testing—each coded and analyzed separately (no = 0; yes = 1). In addition to providing information on variables that may relate to risk status, data from the SIQ was used, as appropriate, to motivate parents to accept a recommendation to contact their child’s PCP (described in more detail below).

Procedure

All project procedures were reviewed and approved by The University of Southern Mississippi Institutional Review Board prior to the start of the project.

Project staff—Project staff were part of a grant-funded project and were external to the school system but interacted directly with school personnel and conducted all school staff training in the school setting. The project staff members working in the training role at schools had master or doctoral degrees in psychology, social work, or education or were graduate students in one of these fields.

Project planning and training with schools—The project began following planning with administrators at the school district level for all five districts. Specifically, the project

coordinator and other project staff met with key personnel, including the district superintendent, in each school system. The planning meetings were for the purpose of creating guidelines for the project, which included a request from the administrators for project staff (rather than teachers) to interpret screening results to the families. Whereas we felt it would be ideal for teachers to communicate screening results directly to parents, the teachers and administrators resisted this approach because of time constraints and guidelines prohibiting teachers from bringing up the possibility of an ADHD diagnosis. During planning, the school administrators directly suggested that active consents for screening (which were required by the Institutional Review Board; IRB) be part of the initial registration process to maximize return rate. A total of five school districts and forty schools agreed to be involved in the project. Thus, consent forms for screening were sent home at the start of the school year with other beginning-of-the-year paperwork for all children in these five school districts. See Figure 1 for procedural flow.

School training involved project staff presenting teachers and other school personnel with the overall goal of the project and familiarizing them with the online screener. All teachers attended a one-hour training session prior to completing the screening forms. If requested, a follow-up, refresher training was provided (which was requested by five schools total). In one school district, based on the district's preference, project staff trained one school representative (counselor), who then trained all of the teachers in that school. This training procedure was considered acceptable given that the web system utilized for the school-based screeners, Child Health and Development Interactive System (CHADIS; www.CHADIS.com), is currently being used in 47 states to collect teacher VADTRS by having parents initiate an email link to their child's teacher from within the system without any prior instruction and has been used by thousands of teachers outside of this study environment.

Data collection—Of 17,440 potential students to be screened, active parental consent was obtained for 8,197 children. Following signing written informed teacher consent and participating in the training, teachers who agreed to participate completed the VADTRS via CHADIS (www.CHADIS.com) for all children in their classroom for whom active consent from parents had been obtained. Depending on the active consent return rate for the classroom, teachers could have over 20 forms to complete on their students in total. As an incentive, teachers received gift cards to an area store for classroom supplies with a prorated amount based on the number of screeners completed. Nevertheless, some teachers did not comply with the request to complete the screeners, despite parental active consent, encouragement from project staff, and available incentives. As such, teachers completed screeners on 5,772 of the children with active parental consent.

VADTRS screeners were collected between October and December from which 1,044 children were identified as at risk for ADHD. SIQs were collected in May of the first school year of the project only for at-risk children. Teachers completed the SIQ on 853 of the at-risk children, representing 81.7% of the total at-risk sample. SIQs were not collected on the full risk sample due to some teachers not complying with the request to complete the measure. Given that the SIQ requested information about the child's services, teachers were

able to return to the survey as needed if they required time to gather additional information from the child's file to answer the survey questions.

Notably, the project period was two years; for children initially screened at-risk in fall of year one, the VADTRS was collected again in spring of year one (at the time of the first SIQ collection) as well as both fall and spring of year two. Likewise, the SIQ was collected again in spring of year two on at-risk children. Follow-up VADTRSs and SIQs on at-risk children were used to provide additional data to motivate parents during interviews (when reached) or in letters (when trying to initiate contact, as described below). However, only data for the initial year one VADTRSs and SIQs are presented in this report.

Parent interviews—Semi-structured telephone parent interviews began in spring of the first school year, after at-risk children ($n = 1,044$) had been identified from all screening data. These interviews were conducted by project staff (trained graduate student research assistants) with parents of children identified as at risk for ADHD to inform them of the ratings and to recommend that they see the child's own PCP—or another doctor, if preferred. Project staff were extensively trained using role-play via an iterative model using expert consensus. Project staff were trained during multiple training sessions, totaling 5 to 6 hours, with ongoing monitoring of progress, discussion of cases, and enhancement of interviewing skills. Two experienced developmental-behavioral pediatricians and one experienced clinical psychologist provided the trainees with feedback, and relevant clinical issues were discussed. Regular sessions were used to review interview algorithm issues to ensure that their approach was an appropriate balance of being professional, unbiased, and friendly as judged by the above noted experienced clinicians.

We felt that a standardized approach to conveying the risk information to parents would be beneficial using an adaptation of motivational interviewing techniques. Motivational interviewing has been shown to improve referrals for conditions—such as smoking and addiction—that are not emergencies and are often associated with ambivalence (Lundahl, Kunz, Brownell, Tollefson, & Burke, 2011); however, this approach has not yet been reported as applied to the problem of parent medical referral for a potential diagnosis of ADHD. Elements of motivational interviewing were used to determine if parents agreed that their child had problems as reported on the teacher screener (i.e., “Usually these screenings just bring up things that parents have already noticed. Have you noticed if your child has had any difficulties with schoolwork or behavior at school or at home?”) as well as to educate parents about the symptoms of ADHD, that symptoms and impairment can vary across settings (e.g., “may show up more at school than home”), and that treatment did not necessarily involve prescription medication. Finally, if parents did not accept the recommendation to visit the child's PCP, they were asked, “Are there specific reasons you don't want to participate?” and an algorithm led the interviewer through motivational interviewing techniques to address various concerns (e.g., lack of time, lack of money, not wanting medication prescribed, spouse objects). Length of parent interviews varied somewhat (on average, approximately 10 to 20 minutes), depending on the amount of detail provided by the parent in response to open-ended questions and the number and nature of follow-up questions from the parent.

Responses provided by the parents during the interview process (or reasons for missing data) were recorded as notes by the interviewers and entered into a database as qualitative responses. The qualitative responses from the 636 completed parent telephone interviews were independently coded into categorical variables by both a Ph.D.-level clinical psychologist and a doctoral student. The variables of interest included: (1) contact status and outcome [e.g., contacted (yes = 1; no = 0); said they would go to the PCP (accepted recommendation; yes = 1; no = 0); what prevented contact]; (2) reason for refusal (if applicable); (3) parent-reported child difficulties/impairment; (4) parent-reported diagnoses, including ADHD; and (5) report of prior/current medication use. Accepting a recommendation was defined as an indication that they would visit their child's PCP to share the screener results. Participants who refused to visit the child's PCP about the screener results at the time the recommendation was made were considered to be a refusal, even if they indicated that they were already seeking treatment. Such coding maintained a conservative count of who accepted the recommendation based specifically on the screener results. Inter-rater reliability between the two coders for all ratings across all 636 participants who were directly interviewed yielded an average kappa coefficient of .92.

Additional strategies—In an attempt to further improve parent access and enhance participation, follow-up with at-risk children extended into the second school year. To deal with the possibility that the graduate student research assistants might be viewed as not having the auspices or experience for these discussions, we attempted two other strategies during the second school year. First, during a second wave of telephone contacts following the second year fall screening, a personalized letter to the parents that included detailed individualized behavioral data describing the child's specific symptoms extracted from the VADTRS reports was added and delivered from the teacher through the child to the parent. These letters were delivered for the entire cohort of children screening at risk for ADHD on the initial screen and encouraged the parents to follow-up with the PCP. Another strategy to further improve access and participation was to contract for a “master teacher,” formerly employed by the school but not the child's teacher, to call from the school to encourage parent communication with the PCP during a third wave of calls initiated in the spring of the second year. Participants were excluded from these methods once the recommendation was accepted.

Unfortunately, this project was not funded to follow up with families or doctors to determine if families who accepted the recommendation actually contacted the PCP or had a visit to discuss the at-risk behaviors.

Results

Most results are descriptive; when inferential statistics (correlations, *t*-tests, and analyses of variance [ANOVA]) are presented all nominal variables were dichotomous and dummy coded. See Figure 1 for a summary of descriptive results (i.e. frequencies) at each project stage.

Screening Consents and Completed Screeners

Of the 17,440 children eligible for screening in the five participating school districts, active consent for screening, as required by the IRB, was obtained from 47.0% of their parents for a total of 8,197 children. Teachers completed screening for 5,772 children for whom active consent from parents had been obtained (70.4% of children with consent).

Children were differentiated as either at risk for a diagnosis of ADHD or not based on the standardized VADTRS scoring, with 1,044 children (18.1% of those screened) identified as at-risk (693 boys and 351 girls). The gender distribution of children identified as at-risk (roughly a 2:1 ratio) is consistent with the gender distribution of ADHD in epidemiological samples (Wilens et al., 2002). Based on the teacher screener alone, 569 (54.5%) were classified as showing symptoms consistent with ADHD–Inattentive presentation, 158 (15.1%) as ADHD–Hyperactive/Impulsive presentation, and 317 (30.4%) as ADHD–Combined presentation. The VADTRS total ADHD symptoms score ranged from 15 to 54 ($M = 33.26$, $SD = 9.21$).

Contacted or Not Contacted

Overall, 636 of the 1,044 parents of children screened as at risk (60.9% of total) were able to be directly contacted. A total of 132 parents (12.6% of total) neither answered the valid phone number nor returned repeated messages. We were unable to reach 276 parents (26.4% of total) because of invalid or disconnected phone numbers, despite having the most up-to-date contact information from the school. A larger proportion of the contacted group was White ($M = .68$, $SD = .02$) than for the no-contact group ($M = .56$, $SD = .04$), $t(566) = -2.76$, $p = .01$, whereas a larger proportion of the no-contact group received free or reduced lunch ($M = .45$, $SD = .04$) than those contacted ($M = .34$, $SD = .02$), $t(566) = 2.50$, $p = .01$. Other demographic variables and ADHD symptom severity were not related to contact status.

Table 1 presents descriptive statistics and ANOVAs comparing race and socioeconomic status (free/reduced lunch) data for participants by district (and in comparison with the district overall; Mississippi Assessment and Accountability Reporting System, 2014). Several statistically significant differences emerged between districts for percent at-risk who were White and percent at-risk who had free/reduced lunch (see Table 1, districts that do not share subsamples for each analysis are significantly different). In particular, District 5 had fewer White students than any other district and had the most students on free/reduced lunch (significantly more than two of the other four districts).

Parent Perception of Problems

For the 636 parents of at-risk children contacted, 315 (49.5%) agreed that the child displayed ADHD symptoms, and another 119 (18.7%) reported some other problems (Table 2). Correlation analyses indicated that whether parents agreed that the child displayed problems was not significantly related to any of the measured demographics, ADHD symptom severity, other diagnosis symptom severity, classroom/academic impairment, discipline referrals, or use of services.

Accepting or Refusing a Recommendation to Contact PCP

More than half ($n = 338$ of the 636 parents of at-risk children contacted or 53.1%) accepted the recommendation to contact their child's PCP by verbally agreeing to do so, whereas 246 parents (38.7% of parents of at-risk children contacted) refused (Table 3). Despite conversing with the project staff, another 52 parents (8.2% of parents of at-risk children contacted) neither agreed nor refused but put off the decision about the project repeatedly each time they were contacted.

Of those 298 parents of at-risk children not accepting the recommendation, 83 parents (27.9%) denied that the child had a problem, whereas 103 parents (34.6%) did not indicate a reason for refusal. Another 16 parents (5.4%) indicated their refusal to accept the recommendation was because they blamed the teacher or the school for the problem. A total of 6 parents (2.0%) said the problems were due to other life events and stressors, and 45 parents (15.1%) indicated that they did not want to seek treatment for the child (often largely due to concerns about medication). Lack of resources (e.g., time, internet access, money for a doctor's visit) as their reason for refusal of the recommendation were cited by 12 parents (4.0%). Finally, 33 parents (11.1%) did not accept the recommendation to visit their child's PCP with information about this screener because they were already previously seeking treatment (Table 3). These parents were considered refusals to avoid inflating the percentage of acceptances to visit the child's PCP attributed to the school-based screening process.

Parents accepting the recommendation to visit the PCP, were more likely, $r(532) = .09$, $p = .04$, to have an IEP for the child and were more likely, $r(532) = .11$, $p = .02$, to have a child receiving related school services, such as counseling or preferential seating. None of the other variables assessed related to parents' acceptance of the recommendation to contact the PCP (Table 4). These variables included demographics, other specific school-based services, discipline referrals, ADHD symptom severity, other diagnosis symptom severity, and classroom/academic impairment.

District-level Outcomes

Table 5 presents results for ANOVAs comparing outcomes at each stage of the project by district. Several statistically significant differences emerged between districts, including differences in the percent eligible who returned consents, percent consented who were screened by teachers, and percent at-risk who were able to be contacted (see Table 5, districts that do not share subscripts for each analysis are significantly different). District 5 had the lowest rates of students eligible who returned consents, the lowest rates of teachers who completed screening, and the lowest rates of successful contact of parents of at-risk children. Interestingly, District 5 also had the lowest rates of White at-risk students and the highest rates of at-risk students receiving free and reduced lunch (Table 1), suggesting that this district may be at greater socioeconomic disadvantage than other districts. Districts 2 and 4 had the highest percent of teacher-completed screeners for children with active parental consent. No differences in districts emerged for the percent of screened children designated at-risk or the percent of contacted parents that accepted the recommendation to contact their PCP (Table 5).

Discussion

The goal of this project was to explore the feasibility of improving early detection of children at risk for ADHD by opening a line of communication with parents and PCPs using school-based screening via online teacher ratings on the VADTRS. We found high rates of at-risk children, and the project had relatively high rates of success in parents agreeing to contact their child's PCP—higher than typical rates of referrals from PCPs to mental health professionals, which are below 50% (Howard, 1995). Nevertheless, we do not know if contact was actually made or benefits of earlier child intervention were obtained. The project discovered barriers to effective screening and referral, including getting parents to consent to screening, getting teachers to complete screeners, reaching parents to inform them about their child's at-risk status (even when they had consented to screening), and obtaining agreement for them to contact the PCP (even when they were reached).

For children identified as at-risk for ADHD, 39.1% of parents could not be reached due to invalid or disconnected telephone numbers or due to parents not answering the phone or returning messages. This group of parents who could not be contacted included a smaller proportion of White families and a larger proportion of low socioeconomic status families. Of the 636 parents reached and interviewed, most agreed that their child had problems; however, 31.8% of interviewed parents did not agree that their child displayed significant symptoms consistent with ADHD or other problems, even though these children had similar teacher ratings to those of parents who did see problems. Children of parents who did not accept the recommendation to go to the PCP had the same level of ADHD symptoms (based on teacher ratings) as the children of parents who accepted the recommendation; thus, the need for the recommendation was there but other factors interfered with parents' acceptance of it.

Among parents reached, those with children who had an IEP or who received other related services were more likely to accept the recommendation to contact the doctor. This finding may represent a tendency for families who are already engaged in school services to more readily participate in additional available services (i.e., may be more activated) or to view information from the school as more likely to be helpful or of positive intent. It may also reflect children with more severe problems other than ADHD. Notably, the information project staff provided to the parents (even those who did not accept the recommendation) should have made them more aware of their children's problems and may increase later help-seeking behaviors (e.g., mentioning at next doctor's visit) although this was not tracked for the current study.

Barriers to School-based Screening and Parent Follow-up

School/teacher-related barriers—Anecdotally, the best district involvement came from those with upper level administrators (i.e., district superintendent) who supported the project and believed in its ability to improve the outcomes for children with ADHD (i.e., Districts 2 and 4). These superintendents paved the way for us to provide adequate information and training to the teachers and staff within the school districts. Such support from superintendents was gained by holding meetings with key personnel, including the district superintendents, and allowing them to make suggestions for implementation elements for the

project (i.e., essentially forming a partnership toward a common goal). This high level of involvement (as perceived by project staff) likely played a role in obtaining a significantly higher percentage of screener consents for eligible children and a significantly higher percentage of screeners completed by teachers for consenting children from these two districts when compared to the others. In contrast, for District 5 (i.e., the district with the fewest White students and the most students on free/reduced lunches), only about one-quarter of screeners (significantly lower than two other districts) were actually completed by teachers even though active consent had been obtained from the parent. Families from this district were also the most difficult to contact (less than one-third could be reached) and, notably, the schools in this district rarely had updated contact information to share with project staff when phone numbers were found to be invalid.

Similar to having good administrator involvement, having a contact and advocate (e.g., school counselor) within the school system facilitated efficient screening (which was also the case for Districts 2 and 4). Buy-in was enlisted from advocates by investing time in training, adjusting timelines to accommodate their other demands, and regularly visiting the school to offer support for the project as needed. Nevertheless, even when principals were in agreement, we spent a large amount of time following up with teachers to get them to provide data.

Although a brief, easily accessible online screening format and standard validated checklist were used, teachers often cited measure length and inconvenience (e.g., not enough time) as a reason for not providing data. Certainly, for school-based screening, the length of the measure should be considered, given that teachers would be asked to complete it for each student. Perhaps the use of a shorter measure for this initial screening would address the time inconvenience for teachers, thereby improving overall teacher compliance in completing the screening. Notably, however, our teacher involvement rate was relatively high (teachers completed screeners on 70.4% of children with consent) compared to the reported involvement rates in other studies (e.g., 32.5% of eligible teachers participated in screening in the Wolraich et al. 2005 study).

Overall, it appears essential to have full engagement from school administrators and teachers for school-based screening to succeed. Such a result is consistent with research showing that children with disabilities have better outcomes when their general education teachers have a higher level of engagement, such as expressing an attitude of ownership and responsibility toward students with disabilities and collaborating closely with others to serve them (Giangreco, Broer, & Edelman, 2001). At a minimum, it is necessary for the school infrastructure to include active efforts to ensure that up-to-date addresses and phone numbers are available.

Participant-related barriers—Given the finding that significantly more socioeconomically disadvantaged students could not be reached, it may be that some families had moved due to economic or housing difficulties. Contact was often hampered by disconnected phone numbers, possibly temporary cell phones. Often, even the updated contact information from the school was incorrect creating a safety issue for the schools even apart from this project. Even when phone numbers appeared to be valid, some parents

simply never answered and never returned messages despite modifications made to improve response (e.g., caller ID of “Pediatrics” or a school). Attempts to reach parents via letters with individualized reports sent both through the child’s backpack and through the US mail did not prove fruitful overall.

Our results are also consistent with research on participant-related barriers to recruitment in other health-related areas (Cooley et al., 2003), which suggests that demographic characteristics can have a profound effect on participant enrollment and attrition (Harris, 1998). In this study, the school district with the lowest percentage of White students and the highest percentage of low socioeconomic status students (District 5; Table 1) also had the lowest percentage of screener consents returned from eligible students than two other districts and had a significantly lower percentage of parents who were able to be contacted when compared to all other districts. Therefore, low parental involvement mirrored the low teacher involvement for this district. Accordingly, socioeconomic disadvantage may be a barrier to getting parents and teachers involved in screening in the first place. Again, addressing infrastructure, teachers or project staff may need to go to the schools at pick-up and drop-off times and meet with parents face-to-face or even make home visits—techniques which may be particularly important when working with socioeconomically disadvantaged families, such as those in District 5 of the current study. In addition, novel techniques (e.g., meeting at a fast-food restaurant or public library to discuss school involvement with parents which communicates a willingness to come to them in their community setting) might be considered. Finally, it is also important to communicate to parents that they are experts on their children and that teachers and other educators have much to learn from them and alongside them (Souto-Manning & Swick, 2006). Such techniques could improve parental involvement. However, it is notable that, once identified and offered services, parents from at-risk children in District 5 were just as likely or more likely to seek help for their children (i.e., based on percentage contacted who accepted the recommendation to their PCP).

A second participant barrier was parental perception of the child’s screened problem, consistent with literature suggesting that parents and teachers often demonstrate low concordance when assessing child ADHD symptoms (Bhatara et al., 2006). Parental under-identification of child ADHD symptoms may be reflective of an overall lack of knowledge within the general public about ADHD characteristics and impairments (West, Taylor, Houghton, & Hudyma, 2003). Parents may have denied symptoms that were, in fact, present simply due to a lack of understanding of the symptoms and knowledge that certain behaviors are atypical. It is also possible that their child simply does not display these behaviors in the home environment and that the problems may be more related to demands of class or specific learning or instructional issues. In addition, research shows that parents’ knowledge about ADHD is least regarding treatment for the disorder (West et al., 2005), and we found that many parents were wary about medication (commonly cited reason for the 15.1% of parents not accepting the recommendation who cited not wanting to seek treatment), which is consistent with empirical findings (e.g., Berger-Jenkins, McKay, Newcorn, Bannon, & Laraque, 2012). Anecdotally, some parents appeared to suspect that the project had an agenda to send their child to the doctor for a medication prescription even though callers were trained to specifically mention evaluation and treatment that do not only involve medications. What this study documented, however, is that only 19.4% of children whose

parents identified that they had an ADHD diagnosis were on evidence-based types of medicine for ADHD, which appears to be low given that medication is the most effective treatment for this condition.

Parents' under-identification of problems may also indicate that they were unaware of their child's difficulties in school due to potential poor parent-teacher communication (Winterbottom, Smith, Hind, & Haggard, 2008). In fact, a number of teachers told us specifically that the part of the project they liked best was that they would not be responsible for informing parents about the children's attentional and behavioral problems. The surprisingly large number of families for which the schools did not have the right phone number suggests that the teachers were unlikely to have been communicating about the difficulties that they had noted in the ratings for those children. However, we found that it was somewhat difficult for a third party (with no direct observation) to persuade parents to seek medical consultation based on results of school-based screening ratings completed by teachers. The rate of acceptance of a recommendation to see their PCP might have met with greater success if the children's teachers were directly involved in the communications with the parents. However, such a large number of screened children (18.1%) were identified as at risk that schools may be concerned about the time and costs of further teacher involvement. Nevertheless, this level of positive screen rate is consistent with other studies using teacher screeners for ADHD (Wolraich et al., 2005), and it is expected given that a screener is meant to cast a wide net and necessarily will identify children at-risk for a diagnosis but not necessarily meeting full criteria for ADHD (Wolraich et al., 2013).

A number of factors have been suggested to influence parental decisions to seek consultation once informed that their child is at risk for ADHD, including clinical and demographic characteristics (Bussing, Zima, Gary, & Garvan, 2003; Sayal, Hornsey, Warren, MacDiarmid F, Taylor, 2006). However, we did not find these factors to relate to whether a parent accepted or rejected the recommendation to contact their PCP.

Limitations and Future Directions

Given unreturned consents or uncompleted screeners by teachers, only about one-third of eligible children actually were screened. Thus, a substantial number of children who might have been identified as at risk were not screened. The IRB requirement for active consent presented an obvious barrier to access to many of these children. It is of interest that the study by Wolraich et al. (2005) conducted school screening with only passive consent being required. They were able to screen 399 more children than this project within a similarly sized school system. Nevertheless, given the potential barrier to active consent, we hope there will be a time when this type of screening will be considered standard of care and not require active consent.

Due to incorrect contact information for some of the children who screened as at risk, it is not possible to know if follow-up letters were ever received; therefore, this project may underestimate potential parental response to recruitment efforts. We also have no data on how many of the parents who agreed to contact their doctor actually did. Although we gave child-specific information to parents (e.g., about comorbid problems assessed by the VADTRS) and general information to school personnel (e.g., in-depth discussion of the

importance of the school personnel in detection, referral, and ongoing feedback in the achievement of positive outcomes) plus gift cards to teachers, other efforts with the parents and schools (e.g., offering a group meeting on ADHD or related topics where referrals could be made) might have further motivated involvement.

By essentially taking the “burden” from the teachers of making recommendations to see the doctor, we may have taken away the most important force to convince many parents of the value and need to address the child’s symptoms. We strongly recommend that future studies of school-initiated screening involve teachers directly in communications with parents. It is possible that it could be built into the natural time for parent-teachers meetings associated with formal Parent Teacher Association meetings. We would speculate that the overall time and effort for teacher involvement might actually be reduced if subsequent efforts related to discipline and communication with parents about disruptive or inattentive behavior is reduced because children who are properly treated require less teacher effort. It appears somewhat ironic that these teachers—who have rated children as having difficulties that often represent a significant burden to themselves as teachers, the class as a whole, as well as to the children—are reluctant to suggest to parents that they pursue the possibility of further evaluation for possible ADHD and associated evidence-based treatment. However, it is likely that the same teachers would have little compunction about referring children who have “focus problems” discovered by school-based vision screening. We speculate that the difference in parent and teacher attitude between a referral for a positive vision screen and a positive ADHD screen may represent the bias that is at the heart of the barriers discovered here.

Although the structured parental interview assessed for specific barriers in an attempt to problem-solve with parents, these specific potential barriers were not considered in advance for the parent interview. Future research should systematically evaluate all possible barriers to parental involvement. Indeed, referrals have been found to be most successful when all caregivers are involved and in accord, when there is a perceived need, when past experiences with mental health care have been positive, when the problem is seen as disruptive to the family, and when treatment is viewed as potentially helpful (Howard, 1995).

A little less than half of the parents remained unmotivated by results of teacher screeners conveyed by non-school personnel to accept a recommendation to visit their child’s doctor. Perhaps conveying this information from school personnel would be more compelling. For example, one possibility is to add a condensed number of ADHD symptoms to the “conduct section” of a standard report card as a way to have school personnel routinely communicate on these items for all students. Future research may examine the effectiveness of using standard ADHD ratings in this context. Given the large proportion of children identified by school-based screening, it may be more feasible and acceptable for schools to combine screener results with other risk indicators such as school-based interventions that have occurred before recommending a doctor visit.

Our data from the parents was limited to a single phone conversation and may have come up short in uncovering some subtle aspects of motivation for referral that others have suggested but that remain as speculations, such as reluctance to follow through with these

recommendations because they fear they will be blamed for their children's problems, concern about stigmatization of a diagnosis, or thoughts that their PCP or other doctors do not have competence to address ADHD or other mental health problems (dosReis, Barksdale, Sherman, Maloney, Charach, 2003; Olaniyan et al., 2007).

Implications for Practice

In summary, the goals of this project were to explore the feasibility of initiating school-based screening procedures, identifying at-risk children, communicating risk status to parents of identified children, and recommending that they visit their child's PCP to share the screening results. Ultimately, we hope to see improved parent-teacher-PCP communication. This report describes the barriers encountered when schools initiate screening for ADHD as an attempt to alert parents to risk behaviors in a way that facilitates communication with clinicians and promotes earlier detection for some children. Obstacles were identified in setting up a protocol in the schools and obtaining updated parent contact information from the schools. Barriers were also met when encouraging teachers to complete screeners and parents to accept the recommendation to the PCP. Thus, about one-third of possible children were screened and about one-third of the parents with children originally identified as at risk accepted a recommendation to contact their PCP. Future research is needed to determine how to overcome such barriers and to establish more effective ways to conduct school-based screening and improve communication among PCPs, parents, and teachers for the assessment, diagnosis, and treatment of children at risk for ADHD.

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Figure 1.
Procedures and recruitment flow of project and descriptive statistics (i.e., frequencies) at each stage of the project.

Table 1**Differences in Race and Socioeconomic Status Data by District**

	District 1	District 2	District 3	District 4	District 5	Total
Percent of at-risk children who are White ^a	53.5 _A	51.5	68.1 _A	74.6 _A	9.1 _B	64.1
Percent of district children who are White	44.1	54.6	76.1	21.2	8.1	--
Percent of at-risk children who have free/reduced lunch ^b	44.2 _{ABC}	52.6 _{BC}	27.7 _A	34.7 _{AB}	68.2 _C	37.1
Percent of district children who have free/reduced lunch	56.4	47.7	27.7	28.7	78.5	--

Note. Percentages across districts that do not share subscripts differ by $p < .05$ based on a univariate analysis of variance (ANOVA), using Tukey's honestly significant difference (HSD) post-hoc test. District-level demographic information (percent White and percent free/reduced lunch) is provided for comparison to the children identified at-risk for each district (Mississippi Assessment and Accountability Reporting System, 2014).

^aPercent of children who screened at risk who are White; ANOVA based on $N = 568$; $F(4, 563) = 2.79$, $p < .001$.

^bPercent of children who screened at risk who have free/reduced lunch; ANOVA based on $N = 568$; $F(4, 563) = 1.66$, $p < .001$.

Table 2

Problems of Children Identified as At Risk for an ADHD Diagnosis via Teacher Screening as Reported by Parent during Interview ^a

Parent-reported Problems during Interview	<i>n</i>	% of Parents Contacted ^a
Reported ADHD Symptoms	315	49.5%
ADHD Symptoms Only	251	39.5%
ADHD and Learning/Academic Problems	38	6.0%
ADHD and Other Behavioral Problems ^b	16	2.5%
ADHD and Emotional Problems ^c	10	1.6%
Reported Only Non-ADHD Problems	119	18.7%
Learning/Academic Problems Only	54	8.5%
Other Behavioral Problems Only ^b	33	5.2%
Emotional Problems Only ^c	14	2.2%
Learning/Academic and Emotional Problems	5	0.8%
Other Problem ^d	13	2.0%
Reported No Problems/Denied Problems	202	31.8%
Reported Psychiatric Diagnosis	149	23.5%
ADHD/ADD ^e	134	21.1%
Another psychiatric diagnosis	15	2.4%
On Medication ^f	76	11.9%

Note. ADHD = attention-deficit/hyperactivity disorder.

^aBased on contacted parents (*n* = 636).

^bSuch as oppositionality and/or conduct disturbances.

^cSuch as anxiety and/or depression.

^dSuch as a chromosomal abnormality, Tourette's disorder, obsessive compulsive disorder, or an autism spectrum disorder.

^eOf the 134 parents who indicated ADHD as a primary diagnosis, 18 reported that the child had an additional comorbid diagnosis, such as a learning disability, and 4 of those 18 parents indicated that the child had a third comorbid diagnosis.

^fTotal number of children on any psychotropic medication. Of those 76 children, 33 children (5.2% of contacted at-risk children) were taking a medication with evidence-based efficacy for ADHD including Adderall, Concerta, Focalin, Vyvanse, or Strattera. Of those 33 children, 26 children had a diagnosis of ADHD, per parent report ^e. Thus, only 26 children of 134 with a diagnosis of ADHD (19.4%) were taking an evidence-based medicine for ADHD.

Table 3

Outcomes of Recommendation to Primary Care Physician for Children Identified as At Risk for an ADHD Diagnosis via Teacher Screening ^a

Outcome of Parent Interview	<i>n</i>	% of Parents Contacted ^a
Accepted recommendation to PCP	338	53.1%
Did not accept recommendation to PCP	298	46.9%
Refused the recommendation	246	38.7%
Did not commit either way	52	8.2%
Reason for Refusing/Not Accepting Recommendation	<i>n</i>	% of Parents Not Accepting ^b
No indication of reason for refusal	103	34.6%
Denied the child had a problem	83	27.9%
Did not want to seek treatment	45	15.1%
Due to other life stressors	6	2.0%
Blamed the teacher/school	16	5.4%
Lack of resources (e.g., time, money, Internet)	12	4.0%
Already seeking treatment	33	11.1%

Note. ADHD = attention-deficit/hyperactivity disorder. PCP = primary care physician.

^aBased on contacted parents (*n* = 636).

^bBased on parents not accepting recommendation (*n* = 298).

Relation between Child Characteristics and Parent's Acceptance of Recommendation Status among Contacted Parents

Child Characteristic	N	r^a	Accepted Recommendation		Refused Recommendation		T
			M	(SD)	M	(SD)	
Gender	636	.003	.36	.48	.35	.48	-.07
Age	627	-.01	8.60	1.56	8.63	1.58	.27
Race	386	.001	.68	.47	.68	.47	-.02
Free/Reduced Lunch ^b	386	.10 [†]	.38	.49	.29	.45	-1.87 [†]
Disciplinary Referrals ^c	532	-.003	.43	.50	.43	.50	.07
Has an IEP	532	.09 [*]	.14	.35	.08	.28	-2.04 [*]
Has a Section 504 Plan	532	.02	.01	.10	.01	.09	-0.26
Receives IEP Intervention Services ^d	532	.06	.25	.44	.21	.41	-1.28
Receives Other Related School Services ^d	532	.11 [*]	.63	.48	.52	.50	-2.42 [*]
Received Psychological/Individual Testing	636	.06	.11	.31	.08	.27	-1.23
ADHD Symptom Severity	636	.01	33.07	9.03	32.93	9.12	-.21
ODD/CD Symptom Severity	636	.01	1.39	2.99	1.36	2.88	-.15
Anx/Dep Symptom Severity	636	.01	1.01	2.15	.99	1.94	-.13
Classroom/Academic Impairment	636	.02	27.42	5.31	27.17	5.43	-.58

Note. IEP = Individualized Education Plan; ADHD = attention-deficit/hyperactivity disorder; ODD/CD = oppositional defiant disorder/conduct disorder; Anx/Dep = anxiety/depression; Gender coded 1 = female and 0 = male; Race coded 1 = White and 0 = race other than White; Free/Reduced Lunch, Disciplinary Referrals, IEP Intervention Services, Other Related School Services, IEP, Section 504 Plan, and Psychological/Individual Testing coded 1 = yes and 0 = no. Based on contacted parents ($n = 636$).

^aCorrelation of the variable with recommendation acceptance status, which was coded 1 = accepted recommendation and 0 = refused recommendation; since all nominal variables were dichotomous and dummy coded, Pearson's r and Phi coefficients were the same when nominal variables were used.

^bFree/Reduced Lunch used as an estimate for socioeconomic status.

^cThe relation between recommendation acceptance status and office referrals, $r(532) = .05$, $p = .21$, and between recommendation acceptance status and suspension (in-school or out-of-school), $r(532) = .06$, $p = .20$, were also non-significant when examined separately.

^dIEP Intervention Services are those services that traditionally require an IEP; other related school services may not require an IEP.

[†]trend; $p < .10$.

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Table 5**Differences in Outcomes of Various Project Stages by District**

	District 1	District 2	District 3	District 4	District 5	Total
Number of schools	6	6	15	7	6	40
Percent eligible who returned screener consents ^a	41.9 _{AB}	72.9 _C	50.5 _{ABC}	58.2 _{BC}	28.5 _A	47.0
Percent consented who were screened by teachers ^b	72.0 _{AB}	94.6 _B	58.3 _{AB}	87.2 _B	26.8 _A	70.4
Percent screened who were at risk ^c	23.7 _A	23.1 _A	18.8 _A	18.7 _A	27.7 _A	18.1
Percent at risk who were able to be contacted ^d	52.3 _A	62.1 _A	61.2 _A	68.9 _A	29.5 _B	60.9
Percent contacted who accepted the recommendation to contact PCP ^e	55.1 _A	56.8 _A	50.9 _A	51.6 _A	61.5 _A	53.1

Note: Percentages across districts that do not share subscripts differ by $p < .05$ based on a univariate analysis of variance (ANOVA), using Tukey's honestly significant difference (HSD) post-hoc test.

^aPercent of total students in the district whose parents returned consents to be screened; total percentage based on $N = 17,440$ eligible children; ANOVA based on school-level summary data, $N = 40$; $F(4, 35) = 5.63$, $p = .001$.

^bPercent of children returning screener consents who were actually screened by teachers; total percentage based on $N = 8,197$ children with consents; ANOVA based on school-level summary data, $N = 40$; $F(4, 35) = 5.14$, $p = .001$.

^cPercent of children who were screened who met at risk criteria; ANOVA based on $N = 5,772$ screened children; $F(4, 5767) = 2.16$, $p = .07$.

^dPercent of families with a child who screened at risk who were able to be contacted; ANOVA based on $N = 1,044$ at-risk children; $F(4, 1039) = 7.60$, $p < .001$.

^ePercent of families who were contacted who accepted a recommendation to contact their PCP; ANOVA based on $N = 636$; $F(4, 631) = .47$, $p = .76$.