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Stability of mental disorder prevalence estimates among school-aged children and adolescents: findings from the community-based project to learn about youth-mental health (PLAY-MH) and replication-PLAY-MH (Re-PLAY-MH), 2014–2017

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Abstract

Purpose: This study evaluated the stability over time of prevalence estimates of mental disorders among school-aged children from the same community.

Methods: We compared screening status and weighted prevalence of selected mental disorders from the two-stage school-based South Carolina Project to Learn About Youth-Mental Health (Time 1) and its replication study (Time 2) conducted between 2014 and 2017. During stage 1, two teacher screeners were used to group students into high or low risk for a mental disorder. During stage 2, parents of selected students completed a structured diagnostic interview to assess whether their child met criteria for specific disorders.

Results: For stage 1, 19.9% of students screened as high risk for a mental disorder at Time 2 compared to 17.8% at Time 1. Among students included at both timepoints, 9.1% screened as high risk at both time-points while screening status changed for 20.7%. The overall prevalence of included mental disorders was approximately 18% at both time points There were no differences

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(*P*-values >.05) in prevalence of individual mental disorders between Time 1 (range:0.3%–6.7%) and Time 2 (range:1.2%–7.7%).

Conclusions: Study findings demonstrate that similar methodology yielded similar prevalence estimates of mental disorders and can inform community-level planning for improving mental health in children.

Keywords

Adolescents; Children; Parents; Schools; Prevalence; Mental disorder; Mental health

Introduction

In the United States, mental disorders affect at least one in five children each year [1–3]; by the age of 18 years, two in five children will meet criteria for a mental disorder [4,5]. The prevalence of mental disorders has been assessed using national surveillance systems [6–9] and community-based studies [1,2,10–14]. Estimates vary widely depending on the population included, mental disorders assessed, diagnostic criteria and/or case definitions used, and assessment period (e.g., 3-month, 12-month, lifetime) [2,3,6]. In a nationally-representative sample of children aged 8–15 years (2001–2004), the 12-month prevalence of select mental disorders (i.e., attention-deficit and/or hyperactivity disorder (ADHD), generalized anxiety disorder, panic disorder, eating disorder, major depression, dysthymia) using *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* criteria [15] was 13.1% [8]. In the National Comorbidity Replication – Adolescent Supplement (2001–2004) that evaluated DSM-IV diagnostic criteria for 15 disorders, 40.3% of U.S. adolescents aged 13–18 years had a past-year mental disorder [7], while lifetime prevalence was 49.5% [5].

Estimates from community-based studies using DSM-IV criteria have also varied [1,2,10–14]. In a 2010 study in New Haven, Connecticut, about one in five children aged 1–9 years, met criteria for one or more past-year mental disorders [10]. Among adolescents aged 11–17 years in the Houston, Texas metropolitan area in 2000, 17.1% met criteria for one or more mental disorders in the past year [13]. Among 9–17-year-old youth in rural North Carolina, the 3-month prevalence of at least one mental disorder was 21.1% in 2002 [1]. In a 2014–2015 school-based study of Kindergarten–12th grade (K–12) students in four sites in Colorado, Florida, Ohio, and South Carolina, 14.8%–33.3% of students met criteria for a mental disorder [12].

Studies assessing the prevalence and implications of mental disorders among children and adolescents are key to informing healthcare professionals, policy makers, and the public (including teachers, parents and/or caregivers) on mental health service needs for people living with or affected by mental disorders. However, most existing studies are cross-sectional; only a few community-based studies have assessed mental disorders in the same population of U.S. children at multiple time points [11,16]. School-based screening, in particular, which has been shown to be feasible [17], can help with early detection and identification of problems that could become mental disorders, with potential benefits of early linkage to mental health prevention or treatment services [18].

Assessing stability of mental disorders prevalence within the same populations across time through a replication study can inform evaluation efforts of community-level interventions for improving mental healthcare in children. The goal of this study was to compare screening status (high vs. low risk for a mental disorder) and 12-month prevalence of mental disorders between two-time points among school-aged children and adolescents from a school district in South Carolina.

Methods

Study population

This analysis used data from the Project to Learn About Youth-Mental Health (PLAY-MH) and Replication-PLAY-MH (Re-PLAY-MH), funded by the Centers for Disease Control and Prevention. PLAY-MH was a community-based epidemiologic study conducted across school districts in Colorado, Florida, Ohio, and South Carolina, to estimate the prevalence of specified mental disorders among school-aged children and adolescents in Kindergaten–12th grade (K–12) [12]; only South Carolina data, collected between September 2014 and December 2015, were used in the current study. Re-PLAY-MH, conducted between December 2015 and September 2017, replicated the PLAY-MH methodological strategy in the same participating South Carolina school district (comprised of 20 schools), and compared prevalence between the two-time points. Informed consent and other study procedures were reviewed and approved by University of South Carolina's Institutional Review Board.

Data collection

Both PLAY-MH (Time 1) and Re-PLAY-MH (Time 2) used a two-stage sampling design. Procedures for both studies are summarized in Table 1, with additional details published elsewhere [12,17]. Briefly, during Stage 1 (teacher-screening), teachers completed online screeners (Strengths and Difficulties Questionnaire [SDQ] and the Proxy Report Questionnaire [PRQ]) for 69.1% (N = 7207) and 66.6% (N = 6960) of the K–12 students enrolled in the district at Time 1 (N = 10,443) and Time 2 (N = 10,454), respectively. We did not collect data on the number of teachers who did not administer the screener, or the number of students assigned to each teacher who did not administer the screener; however, the study team made efforts to find another teacher to answer the screener for students whose initially assigned teacher did not complete the screener. If the student's SDQ total score was > 11 (borderline or abnormal range) or if the teacher reported that the student ever or currently displayed tics using the PRQ, then the student was considered high risk for Stage 2 (parent-interview) sampling; otherwise, they were considered low risk. Participants for the parent-interview stage were selected using stratified sampling by risk status, student sex, and grade level (K–5th 6th–12th). Tic disorders were assessed with a new measure; therefore data will be published separately.

The estimated median interval between the teacher-screening stage and the parent-interview stage was 7 months for Time 1 and 12 months for Time 2. During the parent-interview stage, parents completed the Diagnostic Interview Schedule for Children Version IV (DISC-IV), a diagnostic assessment tool to identify children meeting DSM-IV criteria of selected mental

disorders in the past 12 months. Parents of 1506 and 2999 students were selected by stratified sampling to participate in the parent interview at Time 1 and Time 2, respectively. Of these, parents of 276 and 572 students (response rates of 18.3% and 19.1%, respectively) completed DISC-IV interviews at Time 1 and Time 2, respectively.

The current study included DISC-IV modules for externalizing disorders (ADHD, oppositional defiant disorder (ODD), conduct disorder (CD)) and internalizing disorders (obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), mania and/or hypomania disorder, generalized anxiety disorder (GAD), social phobia, separation anxiety, panic disorder, agoraphobia, and major depressive and/or dysthymic disorder). For consistency with DSM-IV [15], only symptom (not impairment) criteria were required for OCD and panic disorder while symptom and impairment criteria were required for all other disorders. Students met impairment criteria for a specific disorder if they had at least two moderate or at least one severe rating of impairment among the six question sets. To meet case definition for ADHD, students also needed to have at least two teacher-reported ADHD symptoms on the SDQ.

Information on demographic variables (sex, age, grade level, race and/or ethnicity, health insurance type, highest level of parent education, free and/or reduced lunch status, and federal poverty level) was obtained from parents, teachers, and the school district. Federal poverty level (FPL), derived from parents' report of number of children and adults in the household and annual household income, was dichotomized as < 200% of FPL (lower income) and ≥ 200% of FPL (higher income) [19].

Data analysis

Unweighted frequencies of demographic variables reported at teacher-screening stage were estimated for each time point. Among those screened at both time points (N = 4238), exact binomial test of proportions was used to compare screening status by demographic variables. For the parent-interview stage, design variables (strata, stratum counts, sample weights) were used to estimate weighted frequencies of demographic variables and weighted prevalence of mental disorders by time. At Time 1, 6 students had unusable DISC-IV data due to computer error and were excluded, yielding an analytic sample of N = 270 for prevalence estimation. Small percentage confidence interval procedures were used to estimate 95% confidence intervals for weighted prevalence [20].

To compare 12-month mental disorder prevalences between Time 1 (reference) and Time 2, weighted logistic regression models were used to estimate prevalence ratios, with the specified mental disorder as the outcome and Time as the independent variable. Weighted logistic regression models were also used to compare prevalence of any disorder, any externalizing disorder, and any internalizing disorder between Time 1 and Time 2 by each level of demographic variable. All unweighted analyses were conducted in SAS v9.4 (SAS Institute; Cary, NC). All weighted analyses accounted for the complex sample design and were conducted using SAS v9.4 survey procedures and SAS-callable SUDAAN v11.0.1 (RTI International; Cary, NC). Statistical significance was defined as *P*-values <.05.

Results

Distribution of demographic characteristics and screening status

Demographic characteristics were distributed comparably for the two-time points for both the teacher screening and weighted parent-interview samples (Table 2). Similarly, 17.8% of students screened as high risk at Time 1 compared to 19.9% at Time 2.

Risk categories by levels of demographic variables

Out of 9855 students screened at either time point, 4,238 (43.0%) were screened at both time points. Of these, 387 (9.1%) screened as high risk at both time points (HH), 2975 (70.2%) as low risk at both time points (LL), 392 (9.3%) as high risk at Time 1 and low risk at Time 2 (HL), and 484 (11.4%) as low risk at Time 1 and high risk at Time 2 (LH) (Table 3). The distribution of the four screening categories differed significantly (P <.001) by each demographic characteristic. Screening as HH was most frequent among males (12.5%), elementary school students (11.7%), non–Hispanic Black children (13.4%), and among students receiving free and/or reduced lunch (11.7%) compared to students in the other corresponding demographic groups. Similar patterns were observed among those with discordant screening results, where 12.5% and 13.5% of males, 9.4% and 12.7% of elementary school students, 11.6% and 14.1% of non–Hispanic Black students, and 10.5% and 14.2% of those receiving free and/or reduced lunch screened as HL and LH, respectively. Conversely, screening as LL was most frequent among females (79.8%), high school students (79.5%), Hispanic students (80.1%), and those not receiving free and/or reduced lunch (79.5%) compared to students in the other corresponding demographic groups (Table 3).

Mental disorder prevalence

The 12-month prevalence of any externalizing or internalizing disorder was 17.6% (95% confidence interval (CI): 12.8, 23.3) at Time 1 and 18.3% (CI: 14.7, 22.3) at Time 2. At Time 1, the most prevalent mental disorders were ADHD (6.7%), ODD (5.7%), social phobia (5.4%), separation anxiety (3.3%), and CD (2.1%). At time 2, ODD (7.7%), ADHD (4.9%), social phobia (3.9%), separation anxiety (3.0%) and GAD (2.1%) were the most prevalent mental disorders (Table 4). Prevalence estimates for mania and/or hypomania, panic disorder, and PTSD at both time points, and estimates of agoraphobia at Time 1, were unstable due to small number of events (N < 5) and are not shown. Comparing Time 2 to Time 1, there were no statistically significant differences (P >.05) in prevalence of any examined mental disorder (prevalence ratio (PR) = 1.04, CI: 0.52, 2.09) or of specific mental disorders (PR range: 0.57–1.55) (Table 4).

Across each level of demographic variables assessed, there were no significant (P >.05) differences in prevalence of any mental disorder across time points (Table 5). Among those who screened as high risk, any mental disorder prevalence was lower at Time 2 compared to Time 1 (34.2% vs. 46.3%, PR = 0.74, CI:0.54–1.01). The prevalence of any externalizing disorders and any internalizing disorders, assessed separately, did not significantly differ (P >.05) by demographic characteristics (PR range: 0.49–2.45) or screening status (PR range: 0.71–1.56) between Time 1 and Time 2 (data not shown).

Students included in teacher-screening stage and parent-interview stage at both time points

Among participants eligible and sampled for stage 2 at both timepoints, only 45 had DISC-IV data at both time points. Of these, 23 (51.1%) screened HH, 10 (22.2%) screened HL, 8 (17.8%) screened LL, and 4 (8.9%) screened LH (Fig. 1A). Assessing diagnostic criteria for any mental disorder, 28 (62.2%) did not meet criteria at both time points, 4 (8.9%) did not meet criteria at Time 1 but met criteria at Time 2, 10 (22.2%) met criteria at both time points, and 3 (6.7%) met criteria at Time 1 but not at Time 2 (Fig. 1B). There were no significant differences in prevalence of any mental disorder, any externalizing disorder, or any internalizing disorder by risk status (HH, LL, HL, or LH). However, due to few events per risk status ($N < 10$), estimates of prevalence ratios were unstable (relative standard errors > 50%) and are not shown.

Discussion

In this study, the distribution of risk status at screening and 12-month prevalence of mental disorders among school-aged children and adolescents in a school district in South Carolina were similar between Time 1 (PLAY-MH) and Time 2 (Re-PLAY-MH). The prevalence of having a mental disorder or of selected mental disorders was 26% lower at Time 2 compared to Time 1 among those who screened as high risk, but did not differ overall or within categories of demographic characteristics between the two time points. About 2 in 3 (70.2%) students screened as low risk for a mental disorder at both time points and only 1 in 11 (9.1%) screened as high risk at both time points. Screening status changed between the two-time points for about 1 in 5 (20.7%) students with approximately half screening low at first and then high, and the other half showing the reverse pattern. The prevalence of at least one mental disorder was similar at both timepoints, about 2 in 11 students (Time 1: 17.6%, Time 2: 18.3%). ADHD, ODD, social phobia, and separation anxiety were the most common mental disorders at both Time 1 and Time 2. This finding is consistent with other studies that have shown that anxiety, ADHD, and ODD are the most common mental disorders to be identified among children and adolescents in high-income countries, including the U.S. [3,7].

Screening as high risk at both time points was most frequent among males, elementary school students, non–Hispanic Black students, and students receiving free and/or reduced lunch, while screening as low risk at both time points was most frequent among females, high school students, Hispanic students, and students not receiving free and/or reduced lunch, thus pointing to racial and/or ethnic and socioeconomic disparities. In addition to South Carolina (SC), the PLAY-MH (Time 1) study was also conducted in school districts in Colorado (CO), Florida (FL), and Ohio (OH). Consistent with Time 1 findings in SC, screening as high risk for a mental disorder was also more prevalent among males in CO, FL, and OH, middle school students in CO and FL, non–Hispanic Black students in CO and FL, and students receiving free and/or reduced lunch in FL and OH [12].

Because only 45 students had DISC-IV data at both time points, we could not assess prevalence of mental disorders by demographic characteristics within different screening categories (i.e., HH, LL, HL, LH), but studies have shown that sex, age, race and/or

ethnicity, and family socioeconomic status are associated with mental disorders [9,12,21]. Although depression screening in primary care and schools has focused on adolescents aged 12–18 years [22–24], our findings support recommended screening beginning in elementary school to promote early identification and to potentially prevent future mental disorders [25].

At both Time 1 and Time 2, approximately 2 in 11 (18%) students met diagnostic criteria for a mental disorder, and these time points were 2 years apart. These estimates were consistent with a 2016 national prevalence estimate for U.S. children aged 0–17 years having diagnosed mental disorder at one-time point (16.5%) [9]. This further demonstrates the vulnerability of school-aged children and adolescents to mental disorders. Early signs of mental illness, particularly those of internalizing disorders, may go unnoticed by parents and teachers, and students themselves may not know they have a mental disorder. Thus, school-based screening, which has been shown to be feasible [17], can be valuable not only for early detection of mental disorders, but also for identifying problems before they become disorders. In addition, many children with mental disorders do not receive treatment [3,26,27]. Therefore, the benefits of school-based screening can be further realized when identified youth are connected to services for prevention, early intervention, or mental health treatment programs as indicated [18]. Teacher-based screeners may be subject to bias, particularly against racial and ethnic minorities; specifically, non–Hispanic Black males are more likely to be rated as problematic compared to their peers. Thus, mental health screening efforts can be improved by taking into consideration potential bias and racial prejudice [28].

Taken together, these findings show the magnitude of mental disorders in a school population, highlighting the role of screening in the identification of mental disorders, and the importance of implementing evidence-based interventions to address these mental disorders in school-aged children and adolescents. Screening and intervention for mental health concerns are especially relevant now, given the effects of the COVID-19 pandemic on children’s mental health, and following the December 2021 U.S. Surgeon General’s advisory highlighting the need to urgently address the youth mental health crisis [29].

Although universal screening can help identify students at risk for a mental disorder [30], effective strategies that go beyond identification could provide pathways for addressing the needs of those students [31,32], including universal prevention approaches that support positive school climates and student and teacher mental health [33,34], school-based mental health services, and integrating behavioral health into primary care [35]. To maximize the benefits of universal school-based screening, timely referrals can connect students identified as at-risk for a mental disorder with follow-up assessment and mental health care services, and an evaluation of school policies [36,37] to ensure that the school environment does not contribute to student stress and risk and instead provides support and connection [33]. Prevention may also play a larger role in communities where treatment resources are limited [38].

This study has several limitations. First, only two time points at a single school district were assessed, limiting the ability to fully account for seasonality and other population-level factors that could impact mental health. Whereas the implementation approach could be

applicable to other settings, including building a collaborative relationship with the school district, the consent process, and execution of study procedures [17], the generalizability of the estimates to other school districts or larger geographic areas is limited. Appropriate intervals of universal screening depend on many factors such as availability of resources, the population being studied, and the healthcare needs of children in that population. Second, at both time points, we used parent reports rather than child reports of symptoms. Parents tend to be better reporters of externalizing disorders [39], while older children and adolescents tend to be better reporters of internalizing symptoms [40,41]. Thus, incorporating both parent and student report (in addition to teacher report) of symptoms could provide a more comprehensive picture of the magnitude of problems, and strengthen longitudinal assessments of mental disorders in children and adolescents. Third, the teacher screening rate was 69% at Time 1 and 66% at Time 2. Not all teachers completed the screener despite efforts by the study team to find another teacher to complete the screener for children who's initially assigned teacher did not complete the screener. Additionally, parents had the option to opt out of having their children screened (9% opted out at Time 1 and 8% opted out at Time 2). We could not quantify the potential association between mental health status and the parent opt-out, but we do not expect there to be an association between the teacher non–completes and mental health status, which is the larger proportion of children who were not screened. Fourth, the parent response rate in Stage 2 at both time points was less than 20%. This was despite the measures that the study team took to maximize response rate including a press release about the study, a website describing the project to parents, and sending parents two informational mailings [17]. We were unable to assess differences in participants compared to invited non–participants; however, the sample was weighted to address non–response and be representative of the school district population, which could reduce bias related to participation. Finally, only 45 students had DISC-IV assessments at both Time 1 and Time 2, limiting our ability to assess changes in prevalence by screening categories within individuals. Although the stability of the estimates points to the chronicity of some mental disorders, we were only able to investigate this among a limited number of individuals over time. However, the study was designed to estimate community-level prevalence, allowing students who were not included during Time 1 to also be assessed for mental disorders during Time 2.

Conclusions

Mental disorders in children are an important public health problem. We show that using similar methodology at two time points yielded similar estimates for mental disorders, suggesting stability of estimated prevalence over a 2-year period in the same community. These data provide support for the replicability of the two-stage epidemiologic methodology for obtaining prevalence estimates and could also inform community-level efforts to identify mental health problems and improve mental health among school-aged children and adolescents.

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Abbreviations:

ADHD	attention-deficit/hyperactivity disorder
CD	conduct disorder
CO	Colorado
DISC-IV	Diagnostic Interview Schedule for Children Version IV
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders Fourth Edition
FL	Florida
GAD	generalized anxiety disorder
HH	High risk at both time points
HL	High risk at Time 1 and low risk at Time 2
K	Kindergarten
LH	Low risk at Time 1 and High risk at Time 2
LL	Low risk at both time points
OCD	obsessive-compulsive disorder
ODD	oppositional defiant disorder
OH	Ohio
PLAY-MH	Project to Learn About Youth Mental Health
PR	Prevalence Ratio
PRQ	Proxy Report Questionnaire
PTSD	post-traumatic stress disorder
Re-PLAY-MH	Replication-PLAY-MH
SC	South Carolina
SDQ	Strengths and Difficulties Questionnaire

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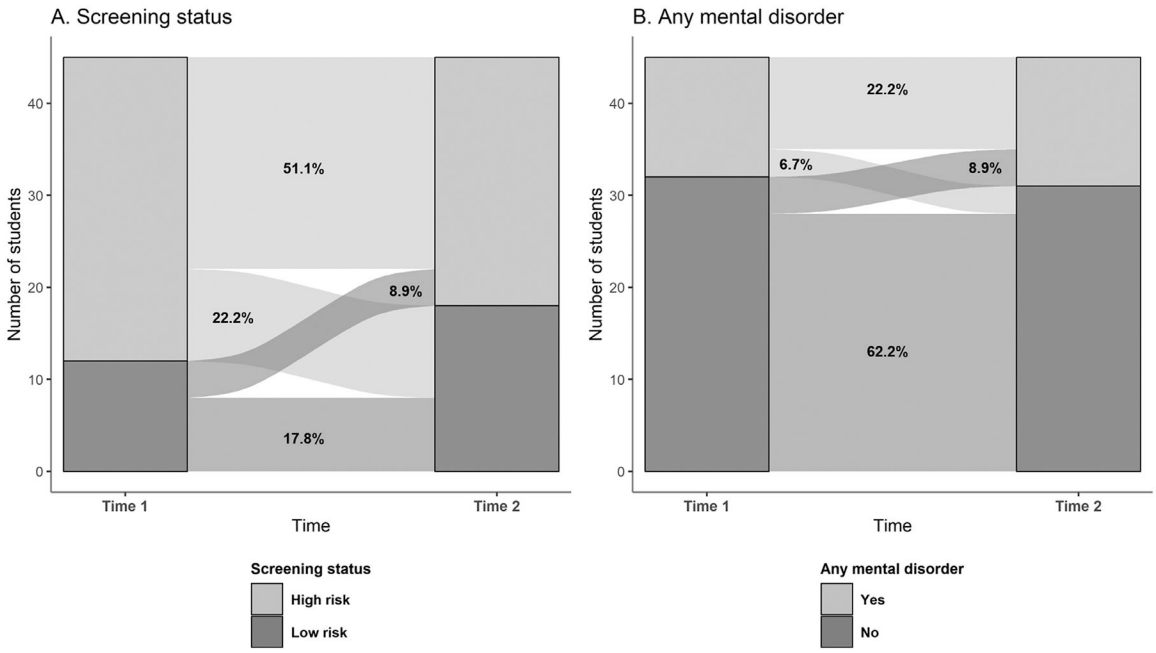

Fig. 1.

Screening status (A) and presence of any mental disorder (B) among students included in Stage 1 and Stage 2 at both time points (Unweighted N = 45).

Table 1

Overview of methodology for Time 1 (PLAY-MH) and Time 2 (Re-PLAY-MH) during teacher-screening and parent-interview stages.

	Time 1 (PLAY-MH*)	**Time 2 (Re-PLAY-MH†)**
School district population	10,443	10,454
Teacher-screening stage (Stage 1)		
Screener data collection period	September – October 2014	December 2015 – February 2016
Screening instruments	Strengths and Difficulties Questionnaire (SDQ), Proxy Report Questionnaire (PRQ)	SDQ, PRQ
Screener administration	Web-based	Web-based
Screening population	All students in school district	All students in school district
Screened	7207 (of 10,443) (69%)	6886 (of 10,454) (65.9%)
% parent opt out‡	9%	8%
Stage 1 completion rate	76.2% (7207/9452)	71.4 (6886/9648)
Respondent teacher	Elementary school (ES): Primary teacher	ES: Primary teacher
	Middle school (MS): 1st period teacher	MS: 1st period teacher
	High school (HS): 2nd block teacher	HS: 2nd block teacher
Teacher incentives	$4 per student screened	$4 per student screened
Parent-interview stage (Stage 2)		
Data collection period	January – December 2015	April 2016 – September 2017
Response rate among those sampled for Stage 2	18.3% (276/1506)	19.1% (572/2999)
Estimated median and interquartile interval (IQI) for number of mo between Stage 1 screener and Stage 2 interview	7 (IQI: 5–10)	12 (IQI: 7–17)
Completed DISC-IV interviews among parents who participated in Stage 2§	270 (97.8%)	572 (100%)
Respondents	Parent and child	Parent and child
Interview type and/or location	In-person at one designated school (for all students included from across the district)	In-person at one designated school (for all students included from across the district)
Interview language	English only	English only
Diagnostic assessments	Diagnostic Interview Schedule for Children Version IV (DISC-IV): demographics, separation anxiety, social phobia, panic disorder, agoraphobia, generalized anxiety, obsessive-compulsive disorder, post-traumatic stress disorder, major depression and/or dysthymia, mania and/or hypomania, attention-deficit and/or hyperactivity disorder, oppositional defiant disorder, conduct disorder, trichotillomania, substance use disorders Description of Tic Symptoms (DoTS)	DISC-IV: demographics, separation anxiety, social phobia, panic disorder, agoraphobia, generalized anxiety, obsessive-compulsive disorder, post-traumatic stress disorder, major depression and/or dysthymia, mania and/or hypomania, attention-deficit and/or hyperactivity disorder, oppositional defiant disorder, conduct disorder DoTS

	Time 1 (PLAY-MH*)	Time 2 (Re-PLAY-MH†)
Incentives for participating families	$50 ($25 for parent and $25 for child)	$75 ($50 for parent and $25 for child)

*PLAY-MH = Project to Learn About Youth-Mental Health (PLAY-MH).

†Re-PLAY-MH=Replication-PLAY-MH.

‡Proportion of parents who opted out of screening procedure for their child.

§6 students had unusable DISC-IV data due to computer error and were excluded from analyses using DISC-IV indicators.

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Table 2

Distribution of demographic characteristics and screening status of students during Stage 1 and Stage 2 by time, project to learn about youth-mental health (PLAY-MH) and replication-play-MH (Re-PLAY-MH), 2014–2017.

	Teacher-screening Stage 1 unweighted N (%)		**Parent-interview Stage 2 Weighted % (95% CI)**	
	Time 1 (N = 7207)	**Time 2 (N = 6886)**	**Time 1 (N = 270)***	**Time 2 (N = 572)†**
Sex				
Female	3465 (48.1)	3255 (47.3)	48.0 (41.9, 54.0)	47.5 (43.3, 51.6)
Male	3742 (51.9)	3631 (52.7)	52.0 (46.0, 58.1)	52.5 (48.4, 56.7)
Grade level				
K-5th (elementary school)	3691 (51.2)	3816 (55.4)	47.2 (41.2, 53.3)	47.5 (43.3, 51.7)
6th–8th (middle school)	1740 (24.1)	1644 (23.9)	23.2 (17.2, 30.2)	22.8 (19.2, 26.7)
9th–12th (high school)	1776 (24.6)	1426 (20.7)	29.6 (21.0, 39.3)	29.7 (23.0, 37.1)
Race and/or ethnicity‡				
Non-Hispanic White	4620 (64.1)	4397 (63.4)	59.1 (49.8, 67.9)	61.9 (56.3, 67.3)
Other race and/or ethnicity	2587 (35.9)	2527 (36.7)	40.9 (32.1, 50.2)	38.1 (32.7, 43.7)
Non-Hispanic Black	1953 (27.1)	1829 (26.6)	25.7 (19.3, 33.1)	28.8 (24.1, 33.8)
Hispanic	340 (4.7)	357 (5.2)	5.0 (1.1, 13.3)	2.2 (0.9, 4.4)
All other race and/or ethnicity	294 (4.1)	341 (5.0)	10.2 (5.3, 17.3)	7.1 (4.8, 10.1)
Insurance type				
Non-Medicaid insurance	-	-	46.8 (37.4, 56.3)	49.2 (43.1, 55.2)
Medicaid insurance	-	-	50.0 (40.6, 59.4)	47.8 (41.8, 53.9)
No insurance	-	-	3.2 (1.2, 6.9)	3.0 (1.6, 5.2)
Highest level of parent education				
High school diploma or less	-	-	21.6 (15.1, 29.4)	24.0 (19.5, 29.1)
At least some college or technical school	-	-	78.4 (70.6, 84.9)	76.0 (70.9, 80.5)
Free and/or reduced lunch				
Yes	4145 (57.5)	4051 (58.8)	57.5 (47.5, 67.0)	57.8 (51.2, 64.1)
No	3062 (42.9)	2835 (41.2)	42.5 (33.0, 52.5)	42.2 (35.9, 48.8)
Federal poverty level §				
<200%	-	-	54.8 (44.9, 64.4)	49.2 (43.4, 55.0)
≥200%	-	-	45.2 (35.6, 55.1)	50.8 (45.0, 56.6)

	Teacher-screening Stage 1 unweighted N (%)		Parent-interview Stage 2 Weighted % (95% CI)	
	Time 1 (N = 7207)	**Time 2 (N = 6886)**	**Time 1 (N = 270)***	**Time 2 (N = 572)†**
Screening status				
High risk	1285 (17.8)	1369 (19.9)	17.4 (13.1, 22.4)	18.8 (14.6, 23.5)
Low risk	5922 (82.2)	5517 (80.1)	82.6 (77.6, 86.9)	81.2 (76.5, 85.4)

Abbreviations: N = number; CI = confidence interval.

*At Stage 2, Time 1: N = 9 missing federal poverty level.

†At Stage 2, Time 2: N = 2 missing insurance type, N = 1 missing highest level of parent education, N = 12 missing federal poverty level.

‡Race and/or ethnicity was teacher-reported at Stage 1 and parent-reported at Stage 2.

§Derived from parents' report of number of children and adults in the household and annual household income such that those below the 200% of Federal Poverty level (FPL) cutoff had lower income and those at or above the 200% of FPL cutoff had higher income.

Table 3

Comparisons of unweighted frequencies of demographic characteristics by risk category among students screened at both Time 1 (Project to Learn About Youth-Mental Health (PLAY-MH) and Time 2 (Replication-PLAY-MH), 2014–2017.

	High risk at both time points (N = 387)% (95% CI)	Low risk at both time points (N = 2,975)% (95% CI)	High risk at Time 1, low risk at Time 2 (N = 392)% (95% CI)	Low risk at Time 1, high risk at Time 2 (N = 484)% (95% CI)	*P*-value*
Overall (N = 4,238)	9.1 (8.3, 10.0)	70.2 (68.8, 71.6)	9.3 (8.4, 10.2)	11.4 (10.5, 12.4)	
Sex					<.001
Female	5.4 (4.5, 6.5)	79.8 (78.0, 81.6)	5.6 (4.7, 6.7)	9.1 (7.9, 10.5)	
Male	12.5 (11.2, 14.0)	61.5 (59.4, 63.5)	12.5 (11.2, 14.0)	13.5 (12.1, 15.0)	
Grade level					<.001
K-5th (elementary school)	11.7 (10.4, 13.0)	66.4 (64.5, 68.2)	9.4 (8.3, 10.5)	12.7 (11.4, 14.0)	
6th–8th (middle school)	5.7 (4.3, 7.3)	74.2 (71.4, 76.9)	11.2 (9.3, 13.3)	8.9 (7.2, 10.9)	
9th–12th (high school)	4.3 (2.9, 6.2)	79.5 (76.1, 82.5)	6.0 (4.3, 8.1)	10.3 (8.1, 12.9)	
Race and/or ethnicity					<.001†
Non-Hispanic White	7.9 (6.9, 9.0)	73.0 (71.3, 74.6)	8.4 (7.3, 9.5)	10.8 (9.7, 12.0)	
Other race and/or ethnicity	11.4 (9.9, 13.2)	65.1 (62.6, 67.5)	10.9 (9.3, 12.6)	12.6 (10.9, 14.4)	
Non-Hispanic Black	13.4 (11.5, 15.5)	60.9 (57.9, 63.8)	11.6 (9.8, 13.6)	14.1 (12.1, 16.3)	
Hispanic	6.0 (3.2, 10.1)	80.1 (74.1, 85.2)	8.3 (5.0, 12.9)	5.6 (2.9, 9.5)	
All other race and/or ethnicity	5.4 (2.5, 9.9)	73.8 (66.5, 80.3)	9.5 (5.5, 15.0)	11.3 (7.0, 17.1)	
Free and/or reduced lunch					<0.001
Yes	11.7 (10.4, 13.0)	63.7 (61.8, 65.6)	10.5 (9.3, 11.8)	14.2 (12.8, 15.6)	
No	5.5 (4.5, 6.7)	79.5 (77.5, 81.3)	7.5 (6.3, 8.8)	7.5 (6.3, 8.9)	

Abbreviations: N = number; CI = confidence interval.

**P*-value from exact binomial test of proportions.

†comparing 4-level race and/or ethnicity.

Table 4

Mental disorder prevalence by time point, project to learn about youth-mental health (PLAY-MH) and replication-PLAY-MH (Re-PLAY-MH), 2014–2017.

	Weighted % (95% CI)		Comparing Time 2 to Time 1 (reference)	
	Time 1 (N = 270)	Time 2 (N = 572)	PR (95% CI)	*P*-value
Any externalizing or internalizing disorder*	17.6 (12.8, 23.3)	18.3 (14.7, 22.3)	1.04 (0.52, 2.09)	.91
Any externalizing disorder	10.9 (7.4, 15.2)	11.7 (9.1, 14.8)	1.08 (0.40, 2.88)	.87
ADHD	6.7 (4.0, 10.4)	4.9 (3.3, 7.1)	0.74 (0.16, 3.38)	.67
Any disruptive behavioral disorder†	6.2 (3.7, 9.8)	8.4 (6.0, 11.3)	1.34 (0.53, 3.41)	.51
ODD	5.7 (3.3, 9.2)	7.7 (5.4, 10.6)	1.35 (0.49, 3.67)	.53
Conduct disorder	2.1 (0.7, 4.6)	1.2 (0.5, 2.5)	0.57 (0.13, 2.47)	.42
Any internalizing disorder	10.7 (6.9, 15.6)	10.8 (7.9, 14.3)	1.01 (0.50, 2.03)	.98
Obsessive-compulsive disorder	1.3[c] (0.3, 3.6)	2.1 (1.1, 3.6)	1.55 (0.50, 4.79)	.42
Any anxiety disorder§	8.9 (5.4, 13.7)	7.8 (5.2, 11.0)	0.87 (0.39, 1.93)	.71
Generalized anxiety disorder	1.7 (0.4, 4.6)	2.1 (0.8, 4.3)	1.19 (0.34, 4.19)	.77
Social phobia	5.4≠ (2.6, 9.9)	3.9 (2.3, 6.1)	0.71 (0.31, 1.63)	.40
Separation anxiety	3.3≠ (1.4, 6.4)	3.0 (1.8, 4.7)	0.91 (0.38, 2.18)	.82
Agoraphobia		2.0 (0.7, 4.6)		
Any depressive disorder‖	2.0 (0.6, 4.8)	1.7 (0.8, 3.1)	0.86 (0.35, 2.12)	.72

Abbreviations: N = number; CI = confidence interval.

*Externalizing disorders assessed were attention-deficit and/or hyperactivity disorder (ADHD), conduct disorder, and oppositional defiant disorder (ODD). Internalizing disorders assessed were generalized anxiety disorder, social phobia, separation anxiety, panic disorder, agoraphobia, obsessive-compulsive disorder, post-traumatic stress disorder, mania and/or hypomania, major depressive disorder and dysthymic disorder.

†Includes children who met study case definition for ODD or conduct disorder.

≠Relative standard error (RSE; standard error and/or estimate × 100%) is > 30%; prevalence estimate is unstable and may be unreliable, therefore it should be interpreted with caution.

§Includes children who met study case definition for generalized anxiety disorder, social phobia, separation anxiety, panic disorder and/or agoraphobia.

‖Includes children who met study case definition for major depressive disorder or dysthymic disorder.

Table 5

Prevalence of any mental disorder across demographic and screening subgroups, by time, project to learn about youth-mental health (PLAY-MH) and replication-PLAY-MH (Re-PLAY-MH), 2014–2017.

	Weighted % (95% CI)			
	Time 1	**Time 2**	**PR comparing Time 1 (reference) versus Time 2 (95% CI)**	***P*-value for PR**
Overall	17.6 (12.8, 23.3)	18.3 (14.7, 22.3)	1.04 (0.52, 2.09)	.91
Sex				
Female	12.6 (7.2, 20.0)	17.8 (12.3, 24.6)	1.41 (0.58, 3.45)	.41
Male	22.1 (14.5, 31.4)	18.7 (14.2, 23.8)	0.84 (0.33, 2.17)	.71
Age (y)				
5–11	19.4 (12.7, 27.7)	22.4 (18.1, 27.2)	1.15 (0.48, 2.77)	.73
12+	15.9 (9.6, 24.3)	15.3 (10.3, 21.5)	0.96 (0.38, 2.44)	.93
Race and/or ethnicity				
Non-Hispanic white	18.1 (11.8, 26.0)	17.9 (13.4, 23.3)	0.99 (0.38, 2.25)	.98
Other race and/or ethnicity	16.8 (9.8, 26.1)	18.8 (13.2, 25.6)	1.12 (0.57, 2.18)	.72
Non-Hispanic black	20.7 (11.7, 32.5)	17.2 (11.5, 24.1)	0.83 (0.38, 1.81)	.61
Hispanic	0	6.3 (0.0, 37.7)	-	-
All other race and/or ethnicity	15.3 (3.9, 36.4)	29.5 (13.1, 51.0)	1.93 (0.44, 8.53)	.34
Insurance type				
Non-Medicaid insurance	13.5 (6.9, 22.8)	14.7 (9.7, 21.0)	1.09 (0.51, 2.36)	.81
Medicaid insurance	21.9 (15.0, 30.3)	21.9 (16.8, 27.8)	1.00 (0.51, 1.97)	>.99
No insurance	10.0 (0.3, 44.5)	14.0 (2.1, 40.2)	1.40 (0.10, 20.61)	.79
Highest level of parent education				
High school diploma or less	23.3 (12.7, 37.2)	19.4 (13.0, 27.3)	0.83 (0.35, 2.00)	.66
At least some college or technical school	16.0 (10.8, 22.4)	18.0 (13.7, 22.9)	1.13 (0.55, 2.31)	.73
Federal poverty level[*]				
< 200%	20.1 (13.7, 27.8)	23.6 (18.5, 29.3)	1.17 (0.56, 2.47)	.65
≥200%	15.8 (8.5, 25.8)	14.8 (9.8, 21.0)	0.94 (0.45, 1.96)	.85
Screening status				
High risk	46.3 (38.0, 54.7)	34.2 (23.8, 45.8)	0.74 (0.54, 1.01)	.04
Low risk	11.5 (6.2, 18.9)	14.6 (10.8, 19.2)	1.28 (0.69, 2.36)	.41

Abbreviations: N = number; CI = confidence interval; PR = Prevalence ratio.

* Derived from parents' report of number of children and adults in the household and annual household income such that those below the 200% of Federal Poverty level (FPL) cutoff had lower income and those at or above the 200% of FPL cutoff had higher income.