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Utilization of Professional Mental Health Services Related to Population-Level Screening for Anxiety, Depression, and Post-traumatic Stress Disorder among Public High School Students

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Abstract

This study examines results from three mental health screening measures in a cohort of adolescent public school students in seven public schools in Southeast [State removed for peer review] affiliated with the [name of study removed for blind review]. We estimated the odds of receiving professional mental health treatment in the previous year given results from different mental health screening batteries: the CES-D 10 battery for depression screening, the Screen for Child Anxiety Related Disorders (SCARED), and the Primary Care Posttraumatic Stress Disorder screen (PC-PTSD).

Overall, students with higher scores on screening instruments for depression, posttraumatic stress disorder, and combinations of screening instruments were more likely to have sought past-year professional mental health treatment than non-symptomatic youth. However, the proportion of students screening positive and receiving professional treatment was low, ranging from 11 to 16%. This study emphasizes the need for broader evaluation of population-based mental health screening among adolescents.

Background

In a given year, between 13% and 20% of children in the United States experience a mental disorder of some type, and half of adult mental disorders begin during adolescence.(Angold, et al., 2002; Belfer, 2008; Merikangas, He, Brody, et al., 2010; Perou, et al., 2013) Overall, 46.3% of adolescents aged 13 to 18 experience some form of mental health disorder, with 21.4% being categorized as severe. For this age group, the prevalence of anxiety disorders is 25.1% (with generalized anxiety disorder seen in 1% of this population), major depression 10.7%, and post-traumatic stress disorder 4% (Merikangas, He, Burstein, et al., 2010). Among those experiencing mental health issues, a little more than half (50.6%) report having received mental health treatment in the previous year according to the National Health and Nutrition Examination Survey (NHANES).

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Poor mental health in this age group can lead to lifelong health and quality of life challenges. For example, adolescents with depression are at increased risk for later major depression, anxiety disorders, substance abuse or dependence, suicidal behaviors, impaired social functioning, and early parenthood (Fergusson & Woodward, 2002). A study on children diagnosed with post-traumatic stress disorder (PTSD) found that one-third were still suffering from the disorder at 5 to 8 years after baseline.(Yule, et al., 2000) Further, mental health issues are a major driving force in mortality rates across multiple age groups, but particularly so for children and adolescents.(Chesney, Goodwin, & Fazel, 2014) Nationwide, 4,600 deaths occur among adolescents aged 10 to 24 every year. Further, 15.8% of high school students had seriously considered attempting suicide during the previous 12 months, and 7.8% of students had attempted suicide at least once over the same period.(Eaton, et al., 2012)

Prevalent mental health concerns among adolescents include anxiety disorders, depression, and PTSD. (Kilpatrick, et al., 2003; Shaffer, et al., 1996; Vigil-Colet, et al., 2009) Even with treatment, the long-term impacts of these conditions can last for nearly a decade. (Yule, et al., 2000) However, these illnesses are often under-diagnosed among adolescents in the clinical setting, particularly among racial and ethnic minorities.(Angold, et al., 2002; Merikangas, He, Burstein, et al., 2010; Miele & O'Brien, 2010; Vigil-Colet, et al., 2009; Zuckerbrot, et al., 2007) Identifying at-risk youth, diagnosing mental health illness and enhancing utilization of relevant services among adolescents remains challenging. Various mental health conditions may be under- or mis-diagnosed (Carlson, Fennig, & Bromet, 1994; Casat, 1982; Weller, Weller, & Fristad, 1995). Further, Owens and colleagues noted that, beyond issues related to diagnoses, additional barriers hinder children/adolescents in accessing mental health services. These barriers included issues related to cost, inconvenience, and other structural issues (Owens, et al., 2002).

Diagnosis of certain mental illnesses typically involves the use of a screening instrument. While such screenings are typically offered in clinical settings, most adolescents currently receive care in school-based settings (Burns, et al., 1995; Cheung & Dewa, 2007; Merikangas, et al., 2011), which has been shown to be the preferred venue for this age group. (Brown & Grumet, 2009; Burns, et al., 1995; Huskey, Sheridan, McGuire, & Olfson, 2011) Previous work has shown that screening in public schools, when coupled with systematic enhancements to the overall mental health system, may be an effective means of identifying at-risk adolescents and connecting them with professional mental health services. (Essex, et al., 2009)

The use of mental health screening tools can be used as an evidence-base for estimating the prevalence of mental illness in the general population. Such instruments have been utilized for screening to identify potentially serious mental health disorders in the general population (Kessler, et al., 2003), and specifically within school-based settings for suicide prevention (Grunbaum, et al., 2004; Shaffer & Craft, 1999). As part of a population-based approach to addressing mental health issues in adolescents, the New Freedom Commission on Mental Health recommended in 2003 that screening in multiple settings (including public schools) be integrated into a broader transformation of a local mental health system. (President's New Freedom Commission on Mental Health, 2003)

The purpose of this article is to report on the potential utility of broad mental health screening in public schools to inform policy makers about potential demand for local mental health services. Research presented here characterizes the current utilization of professional mental health services among a cohort of adolescents enrolled in public schools in terms of the student's responses to three mental health screening batteries. These screening batteries are commonly used in clinical settings, but little research has been conducted on their use in population-based (specifically school-based) settings. This study adds to the current literature by applying these instruments in a diverse school-based setting and determining correlations between battery results and self-reported mental health treatment. Findings from this study will add to the growing evidence-base informing future research efforts and, ultimately, the development of interventions and public policies seeking to better understand and improve mental health status among adolescents.

Data & Methods

Data were analyzed from the [study name removed for blind review], which is a multi-school longitudinal cohort study of 1042 students in 5 school districts in Southeast [state name removed for blind review] using self-reported questionnaires. The purpose of the larger project is to better understand the development of adolescent health, and has yielded noteworthy findings related to adolescent exposure to violence in relationships, substance abuse, sexual health behaviors, and other adolescent health issues. [References removed for blind review] Currently in the fifth wave of data collection, this study began in 2010 when the cohort was primarily in grades 9 (75%) and 10 (25%).

Adolescent Mental Health Screening

This study utilizes data from Wave 4 (collected in 2013, $n = 781$; retention rate of 75%), where a vast majority of participants were about to complete high school (median age = 18 years), and included variables related to screening for post-traumatic stress disorder (PTSD), depression, and anxiety; and utilization of professional mental health treatment in the previous 12 months. Additionally, school-level data for each school surveyed in DIS were obtained from reports generated by the [State name removed for blind review] Education Agency. [Reference removed for blind review] Among the Wave 4 sample, 695 (89%) completed the three mental health screening instruments and the dependent variable. This study was granted human subjects approval from the [Institution Removed for Blind Review] Institutional Review Board.

Of primary interest for this study was whether or not a student received mental health treatment in the past year. Receiving counseling was measured with a single binary question (yes/no) asking if the student had "received mental health treatment in the past year from a psychologist, psychiatrist, social worker, or counselor."

The clinically validated shortened 10-item Center for Epidemiologic Studies Depression Scale (CES-D-10)(Andresen, Malmgren, Carter, & Patrick, 1994) was used to assess for depression based on recall over the past week to 10 items (Cronbach's $\alpha = 0.86$) (Miller, Anton, & Townson, 2008). Consistent with protocol, scores equal to or above 10 (of a possible 30) indicate a positive screening. The 9-item generalized anxiety disorder (GAD)

subscale of the Screen for Child Anxiety Related Disorders (SCARED) was used to screen for anxiety (Cronbach's $\alpha = 0.90$). (Birmaher, et al., 1999; DeSousa, Salum, Isolan, & Manfro, 2013) This battery is comprised of general statements that respondents are asked to rate as being not or hardly true (coded as 0), sometimes true (1), or often true (2). Adolescents who scored equal to or higher than 9 (of a possible 18) were considered positive screens for anxiety. PTSD was screened using the Primary Care PTSD Screen (PC-PTSD), a 4-item yes 1) / no (0) scale with a possible scoring range of 0 to 4. The PC-PTSD asks respondents to respond about any experience they have had that was frightening, horrible, or upsetting during the previous month. Adolescents who endorsed at least 3 items were considered positive for PTSD screening. (Prins, et al., 2003) These instruments have been shown to be valid screening tools in adolescent (CES-D & GAD) and young adult (PC-PTSD) populations. (Birmaher, et al., 1999; Freedy, et al., 2010; Roberts, Andrews, Lewinsohn, & Hops, 1990) The screening tools utilized in this study are not diagnostic.

Finally, we created a global mental health scale by calculating the sum of the three binary positive screening variables for depression, GAD, and PTSD. This variable had a possible range of 0 to 3, representing the number of positive mental health screenings for a given respondent. Three additional dichotomous variables were created: one for respondents who screened positive for any 1 of the three screenings, one for respondents who screened positive for any 2 of the three screenings, and one for respondents who screened positive for all three screenings.

Socio-demographic variables included gender (male/female), race (White, non-Hispanic; Hispanic; African-American; Asian or Pacific Islander; or Mixed or Other race/ethnicity), socioeconomic status, and parental education. For ethnicity, we also aggregated responses other than White, non-Hispanic into a single variable representing racial and ethnic minorities.

Adolescents' socioeconomic status (SES) was estimated using the family affluence scale (FAS), which consists of four questions related to family ownership of vehicles and computers, respondent having their own bedroom, and frequency in previous year of a respondent's family going on vacation or holiday. The composite SES indicator was created by calculating the sum of the responses to these 4 scale variables. This sum was then divided into three groups to create an ordinal indicator of SES (low (scores = 0,1,2), middle (scores = 3,4,5), and high (scores = 6,7,8,9)). (Boyce, Torsheim, Currie, & Zambon, 2006)

Finally, parental education was measured as the highest education level attained for both the respondent's mother and father. Possible responses were "Did not graduate from High School," "Finished High School or Received GED," "Some College or Training after High School," and "Finished College," coded 1 through 4 respectively. A composite parental education measure was created by dichotomizing the mother and father variables as having completed high school (coded 1) or not (coded 0). The composite variable was generated by summing these two dichotomous variables, with possible values of 0, 1, or 2, indicating neither parent, one parent, or both parents having completed high school.

Data about the characteristics of each school were gathered from the [State education agency name removed for blind review]'s 2012 Academic Excellence Indicator System.[Reference removed for blind review] These included data related to the minority concentration of the student body, socio-economic status (percentage of the student body that were classified as economically disadvantaged), and school-level financial investment in education (reported as dollars spent per student annually).

Statistical Analysis

All analyses were conducted using Stata 13.1.(StataCorp) Means and standard deviations were calculated for continuous variables and cross-tabulations were calculated for binary, ordinal and categorical variables. Pearson chi-square tests were conducted to test the association between screening positive for depression, anxiety, and/or PTSD and receipt of mental health treatment. The same tests were used to examine differences in proportion of respondents with positive screenings against the proportion of enrolled students reporting having received professional mental health treatment in the previous year.

Two-level random-intercept logistic regression models were used to model the odds of an individual receiving professional mental health treatment in the previous year. This approach accounts for any nesting of random effects due to students being non-randomly assigned to schools, for models with variables that have statistically significant differences (i.e., nesting) across schools.(Rabe-Hesketh & Skrondal, 2012) For variables with no statistically significant differences detected between schools for key dependent and independent variables, single-level multivariate logistic regression models were used rather than multi-level models.

Six separate models estimating the odds of having received professional mental health treatment were created, one each for anxiety, depression, and PTSD, as well as 3 additional models for the aggregate variables of global mental health (i.e., having any 1, 2, or all 3 positive screenings). For each model, receipt of professional mental health treatment in the previous year served as the dependent variable, and controlled for race, age, sex, parental education, and socioeconomic status.

Results

Overall, 733 students were included in the study. Table 1 summarizes results from the sample's univariate statistical analyses. The sample was primarily aged 17 to 19 years old (98.0%), and had a larger proportion of females (57.8%) than males. The sample was diverse in terms of race and ethnicity, with only 20.6% of the sample self-identifying as White, non-Hispanic. Approximately 26% of the sample self-identified as Black or African-American and another 31.1% self-identified as Hispanic or Latino. Nearly one-third of the sample (29.3%) reported that neither parent completed additional formal education beyond high school, and nearly half (42.4%) reported that both parents completed formal education beyond high school. A majority of respondents indicated that their families owned 2 or more vehicles (79.6%) and that they had their own bedroom at home (82.8%). Students reported that on average, their families had a mean of 2.1 (sd=0.98) computers at home, and 39.6% reported having gone on vacation two or more times in the previous 12 months. Overall, the

sample tended to be slightly more diverse than the schools sampled (79.4% minority in the survey versus 67.1% minority in the schools sampled). Females were also slightly over-represented in the sample compared to the enrolled student body for the 7 schools included in the study.

Positive screenings for anxiety (49.8%) and depression (52.1%) were relatively common with this sample, while positive screenings for post-traumatic stress disorder (PTSD) were relatively less common (19.2). Overall, 30.4% of the sample had negative screenings for all three tests, while 29.6% had positive screenings for only one test, 28.1% had positive screenings for two, and 11.9% had positive screenings for all three tests. It is important to note that these measures alone are not diagnostic for their respective mental health conditions, and those respondents with positive screens may not meet criteria for diagnosis of a specific mental illness. Only 9.4% of the entire sample reported receiving professional mental health treatment in the past 12 months.

Table 2 contains the results from bivariate analyses comparing the respondents who screened positive for anxiety, depression, PTSD, or combinations thereof and reported receiving professional mental health treatment in the past 12 months against those screening negative and not reporting mental health treatment, those screening positive and did not report receiving mental health treatment, and those screening negative and not reporting mental health treatment. All Pearson chi-squared tests were statistically significant at the $\alpha=0.05$ level. Among those screening positive, 11.3% of those screening positive for anxiety reported receiving professional mental health treatment, as did 13.4% of those screening positive for depression and 16.4% of those screening positive for PTSD. Further, 12.1% of those screening positive for any one condition, 12.5% screening positive for any two conditions, and 19.3% of those screening positive for all three conditions reported receiving mental health treatment in the previous 12 months. In all 6 comparisons, groups screening positive had a significantly higher proportion reporting having received mental health treatment in the past 12 months than groups that did not screen positive.

Table 3 presents the results from the school-level analyses. The seven high schools represented in this study come from diverse geographic settings and enrollment sizes, ranging from small and rural to large and urban. The schools varied in enrollment of racial and ethnic minorities (overall 67.1%, with individual school ranging from 20.8% to 90.0%) and student classified as economically disadvantaged (overall 46.2%, with schools ranging from 22.1% to 62.5%). While there were differences in positive screenings for the three tools across the schools, none of the differences were statistically significant. The same was true for differences across schools on reporting receiving professional mental health treatment in the previous 12 months. Results from two-level random-intercept models for each outcome variables showed non-significant ($p>0.05$) likelihood-ratio test results, indicating that the random intercept models were not statistically different than single-level logistic regression models, and, therefore, not necessary.

Since multi-level modeling was not necessary for any of the 6 regression models, table 4 presents results (adjusted odds ratios) from 6 multivariate logistic regression models. For 5 models, respondents with positive screening were significantly more likely to have sought

professional mental health treatment in the past 12 months than respondents with negative screening results, even when controlling for respondent age, sex, parental education and socio-economic status. The likelihood-ratio chi-square test for the anxiety regression model controlling for socio-demographic covariates indicated that this model was not statistically different than a logistic regression model with no covariates ($p=0.053$), therefore the adjusted odds ratios for the independent variables in this particular model cannot be said to be statistically significantly different from 1.0.

Finally, in the three models looking at overall positive screenings, similar findings were observed where respondents screening positive for one, two, and three of the tools were more likely to have reported receiving professional mental health treatment in the previous year. However, independent of their global mental health screening results, respondents whose parents both had formal education beyond high school had significantly higher odds of having received professional mental health treatment in the past 12 months compared to respondents with neither parent having education beyond high school (odds ratios between 2.6 and 2.7).

Discussion

This study explored mental health service utilization among adolescent students enrolled in 7 public schools in southeast [State removed for blind review]. The likelihood of reporting receiving professional mental health treatment was estimated by contrasting students based on their responses to three commonly used clinical screening assessments (generalized anxiety disorder, depression, and post-traumatic stress disorder). While a number of recent studies examining mental health screenings in adolescents focus on youth detained within the justice system (Aalsma, Schwartz, & Perkins, 2014; Colins, Grisso, Mulder, & Vermeiren, 2014), or with particular chronic conditions (such as type-1 diabetes) (Zenlea, et al., 2014), the results of the study provide insight into screening results in a broad sample of adolescents in the general population using 3 clinical screening batteries.

Students with positive screenings tended to have an increased odds of having received professional mental health treatment in the previous year. While students with positive screenings for anxiety did not show a significant increase in odds of reporting receiving professional mental health treatment in the previous year, those screening positive for depression and post-traumatic stress disorder did. Further, students with positive screenings for any, any two, or all three batteries had significantly increased odds for receiving professional mental health treatment in the previous year compared to students with no positive screenings on any of the three batteries, even after controlling for age, gender, race/ethnicity, socioeconomic status, and parental education. For the models estimating odds based on positive screenings to any one, two, or all three screening batteries, parental education was an independent predictor of reporting having received professional mental health treatment in the previous year.

While it is noteworthy that the odds of receiving professional mental health treatment are higher for those with positive screenings, the overall proportion of students with certain positive screenings who reported receiving professional mental health treatment in the

previous year is relatively low compared to the population of adolescents with mental health conditions. Only 11–16% of students with screening positive on one of the screening instruments reported having received professional mental health treatment in the previous year, compared to national NHANES estimates, where nearly half of those with a mental health condition report receiving professional mental health treatment. Of greater potential concern was the small proportion of students with positive screenings to all three batteries (approximately 28% of the sample) who also reported receiving professional mental health treatment in the previous year (19% of those students with positive screenings on all three instruments). While these positive screenings are not diagnostic, these findings suggest that potential demand for mental health services may be higher than expected. The most recent prevalence data available from the National Institute of Mental Health estimates that among children ages 8–15, 50.6% of children with any mental health disorder reported receiving mental health treatment, and 13.4% to 44.7% among adults ages 18–25 with depression. (Merikangas, He, Burstein, et al., 2010) Thus, we expected a higher percentage of our respondents indicating having received professional mental health treatment in the prior year than was reported. Findings could indicate that the sensitivity and specificity of the batteries may be low and may not be adequate for population-level screening purposes among adolescent populations. For example, the CESD-10 was found to be 80% sensitive and 69% specific in a particular adult population (Miller, et al., 2008). Further research is needed to better quantify the sensitivity and specificity of these batteries among adolescents.

There were no statistically significant disparities identified along racial/ethnic or SES stratifiers within this sample. Further, no significant differences in reporting receiving mental health treatment or in screening positive for any of the screening batteries were noted when examining school-level differences among the sampled students. For this sample, our findings suggest that the prevalence of positive screenings, as well as the prevalence of receiving professional mental health treatment, were distributed relatively homogeneously among the public schools sampled in this study, even accounting for the relative heterogeneity in the demographic profiles of the schools sampled (table 3).

The mental health screening batteries utilized in this study are commonly employed in the clinical setting to gain a better understanding of the potential mental health issues a client may be experiencing. While these instruments are not considered a diagnostic tool when used alone, they do provide insight into the client's potential overall mental health status, as well as suggest potential specific issues the client may be facing. To conclude from this study that the students who screened positive require professional mental health treatment would be inappropriate; as would conclusions that those with negative screenings have not experienced episodes of anxiety, depression, or PTSD. The results, particularly among the students with positive screenings to multiple screenings, compared to the reported prevalence of receiving professional mental health treatment among those with positive results does suggest that further study is warranted to better determine if mental health services among this targeted population are underutilized or in shorter supply than may be required.

While some may call for more widespread screening in the adolescent population, such a reform independently of broader mental health system improvements would likely

overwhelm the currently overtaxed system in place. Further, for screening programs, the benefits of such an effort (including effective treatment) need to clearly outweigh the potential harms.(Gilbert, Logan, Moyer, & Elliott, 2001) These potential harms need further exploration. However, if implemented as part of a systematic effort that further refines the positive and negative predictive value of mental health screening tools, while also increasing the supply of mental health professionals to follow-up on positive screenings for diagnosis, increasing resources for both in- and out-patient treatment, removing financial barriers to receiving care, and streamlining the mental health referral system, increasing the use of population-level mental health screening may be warranted. (Weist, Rubin, Moore, Adelsheim, & Wrobel, 2007)

Given this study's inability to identify statistically significant variability across schools in terms of their screening results, as well as the systemic enhancement of the mental health system that would need to be implemented as part of a broader approach to improving the mental health of adolescents, a State- or National-level policy intervention may yield the best results. However, further study with a more representative sample of adolescents on the impacts of such a reform is needed before more specific recommendations can be offered.

There are a number of limitations to this study. Although the sample was drawn from a diverse set of public high schools, the sample may not generalize validly beyond the southeast Texas region. Further, this study is cross-sectional, rather than longitudinal, which limits our ability to interpret temporality between variables. Also, it is possible that our self-reported data can be biased, similar to Petzel and colleagues' study of drug use in a similar population. (Petzel Johnson Mckillip 1973). Self-report bias may be a factor in the reported rates of positive screening. We also do not have data indicating whether a respondent is diagnosed with any mental health condition, nor do we have data indicating whether the mental health treatment sought out by the study population was due to the symptoms they were exhibiting.

The screening batteries used in this study are commonly used in clinical settings to aid in guiding the diagnosis and treatment of specific mental health issues. Future study of the positive and negative predictive value of these batteries is needed among general adolescent populations to confirm that these batteries have sufficient sensitivity and specificity to accurately assess specific mental health burdens in the general adolescent and young adult population. The relative lack of reporting receiving treatment among those with positive screenings could be the result of strong coping and self-management skills in this sample, though a clinically accurate assessment of each student is not possible.

In summary, this study contributes significant evidence of the potential utility of implementing broad mental health screening in public schools. While a call to implement such screening initiative as a stand-alone intervention for improving mental health cannot be made, this research adds to the growing evidence-base informing future research efforts and, ultimately, will support the development of system-oriented interventions and public policies seeking to better understand and improve mental health status among adolescents.

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Table 1

Characteristics of Analyzed Student Sample, n=733

Variable	% / Mean (SD)
Age	
16	0.4%
17	25.9%
18	52.0%
19	20.1%
20	1.6%
Female	57.8%
Race	
White, non-Hispanic	20.6%
Black / African American	25.5%
Hispanic / Latino	31.1%
Other	12.8%
Socio-economic Status	
Family car ownership	
0 cars	1.8%
1 car	18.6%
2+ cars	79.6%
Student has their own bedroom	82.8%
Family went on vacation last year	
Never	31.4%
Once	29.0%
More than once	39.6%
Number of computers at home	2.1 (0.98)
Parental education	
Mother post HS	59.3%
Father post HS	53.3%
Both post HS	42.4%
Neither post HS	29.3%
Received professional mental health treatment in past 12 months	9.4%
Positive Screening	
Anxiety	49.8%
Depression	52.1%
PTSD	19.2%
0 conditions	30.4%
1 condition	29.6%
2 conditions	28.1%
3 conditions	11.9%

Table 2

Proportion of Respondents Screening Positive and Reporting Receiving Mental Health Treatment & Chi-Squared Test Results

Screening	% screening positive	% of positive screening receiving mental health treatment	Pearson Chi-Squared p-value
Anxiety (n=717)	49.8	11.3	0.047
Depression (n=709)	52.1	13.4	<0.001
PTSD (n=720)	19.2	16.4	0.002
Positive screen for any 1 condition (n=695)	29.6	12.1	<0.001
Positive screen for any 2 conditions (n=695)	28.1	12.5	0.021
Positive screen for all 3 conditions (n=695)	11.9	19.3	0.001

Table 3

School Characteristics at Wave 4 (2013)

	School 1	School 2	School 3	School 4	School 5	School 6	School 7	p-value
Enrollment	1,391	453	3,470	1,623	720	2,975	2,285	<0.001
Geographic setting based on [State omitted for blinding] Education Agency ranking and district population density	Small rural	Small urban	Large urban	Large suburban	Small suburban	Large urban	Large suburban / rural	
% Minority enrollment	20.8%	86.1%	74.3%	62.0%	90.0%	76.6%	64.8%	<0.001
% Enrollment economically disadvantaged	22.1%	62.5%	44.4%	53.5%	48.3%	46.5%	54.3%	<0.001
Expenditures per student (<i>USD</i>)	\$5,879	\$6,197	\$6,439	\$7,563	\$10,226	\$6,157	\$6,982	<0.001
Number of students in sample	96	71	71	109	110	149	127	
% positive screenings for anxiety	48.0	52.1	52.7	61.1	44.4	49.7	43.6	0.14
% positive screenings for depression	52.1	44.4	54.1	57.5	52.2	54.9	46.9	0.54
% positive screenings for PTSD	18.0	16.2	23.0	23.0	20.5	19.6	14.9	0.68
% positive screenings for any 1 condition	68.8	66.2	76.1	76.2	66.4	71.1	63.8	0.34
% positive screenings for any 2 conditions	41.7	32.4	38.0	50.5	37.3	43.6	33.1	0.10
% positive screenings for all three conditions	8.3	15.5	12.7	14.7	15.5	9.4	9.5	0.44
% reporting receiving professional mental health treatment in the past 12 months	8.3	8.6	9.5	10.6	10.7	11.6	5.7	0.74

Table 4

a: Logistic Regression Estimates – Odds of Receiving Mental Health Treatment in Past 12 Months									
<i>Variable</i>	<i>Anxiety (n=482)</i>			<i>Depression (n=479)</i>			<i>PTSD (n=485)</i>		
	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p</i>	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p</i>	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p</i>
Positive screening result	2.09	1.09 – 4.01	0.027	2.84	1.44 – 5.60	0.003	2.70	1.37 – 5.32	0.004
Female	1.46	0.75 – 2.86	0.270	1.34	0.70 – 2.60	0.379	1.43	0.75 – 2.71	0.274
White	1.18	0.62 – 2.28	0.612	1.10	0.57 – 2.12	0.773	1.15	0.60 – 2.20	0.680
Parental education									
Neither parent beyond HS	1	Referent		1	Referent		1	Referent	
One parent beyond HS	1.52	0.58 – 3.97	0.397	1.56	0.59 – 4.13	0.372	1.24	0.48 – 3.20	0.655
Both parents beyond HS	2.33	0.97 – 5.62	0.059	2.40	0.99 – 5.79	0.051	2.18	0.93 – 5.12	0.073
Socioeconomic scale									
Lowest tertile	1	Referent		1	Referent		1	Referent	
Middle tertile	1.33	0.57 – 3.13	0.507	1.21	0.53 – 2.78	0.653	1.28	0.55 – 2.95	0.566
Highest tertile	1.20	0.48 – 2.99	0.698	1.19	0.49 – 2.88	0.704	1.31	0.54 – 3.17	0.551
Model likelihood-ratio p-value	0.053			0.011			0.039		

Table 4b: Logistic Regression Estimates – Odds of Receiving Mental Health Treatment in Past 12 Months

<i>Variable</i>	<i>Any 1 Screening Positive</i>			<i>Any 2 Screenings Positive</i>			<i>All 3 Screenings Positive</i>		
	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p</i>	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p</i>	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p</i>
Positive screening result	7.27	2.18 – 24.24	0.001	2.06	1.09 – 3.88	0.025	2.68	1.18 – 6.10	0.019
Female	1.29	0.64 – 2.60	0.470	1.62	0.82 – 3.23	0.166	1.74	0.88 – 3.45	0.110
White	1.12	0.57 – 2.19	0.738	1.13	0.58 – 2.19	0.723	1.15	0.59 – 2.24	0.676
Parental education									
Neither parent beyond HS	1	Referent		1	Referent		1	Referent	
One parent beyond HS	1.80	0.65 – 4.98	0.254	1.75	0.64 – 4.80	0.276	1.63	0.59 – 4.47	0.343
Both parents beyond HS	2.69	1.06 – 6.81	0.037	2.74	1.09 – 6.93	0.033	2.62	1.04 – 6.61	0.041
Socioeconomic scale									
Lowest tertile	1	Referent		1	Referent		1	Referent	
Middle tertile	1.23	0.52 – 2.93	0.637	1.35	0.57 – 3.18	0.497	1.32	0.56 – 3.13	0.526
Highest tertile	1.08	0.43 – 2.72	0.877	1.14	0.46 – 2.87	0.773	1.18	0.47 – 2.95	0.731

Table 4b: Logistic Regression Estimates – Odds of Receiving Mental Health Treatment in Past 12 Months									
Variable	Any 1 Screening Positive			Any 2 Screenings Positive			All 3 Screenings Positive		
	Odds Ratio	95% CI	P	Odds Ratio	95% CI	P	Odds Ratio	95% CI	P
Model likelihood-ratio p-value	<0.001			0.038			0.040		