Racial Differences in Symptoms of Anxiety and Depression Among Three Cohorts of Students in the Southern United States

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The present study aimed to extend the literature on mental health disparities in underserved areas by investigating racial differences in symptoms of anxiety and depression in three cohorts of school children in the Southern United States. White and African American students attending elementary, middle, and high school (n = 3,146) were administered a multi-dimensional measure of anxiety and depression. Racial differences were examined using categorical, dimensional, and latent-variable analytic methods. Although effect sizes were small across all levels of analysis, the categorical and dimensional approaches produced different patterns of significant anxiety-related findings. Additionally, confirmatory factor analysis indicated that the dimensional findings were not due to racial differences in the measurement of anxiety. The results of the current investigation suggest that, among school children, race has modest effects on symptoms of anxiety, but not depression. Further, the differential findings observed across analytic approaches reinforce the importance of measurement and methodology when studying psychopathology in children and adolescents.

Studies have estimated that approximately 21% of children and adolescents have at least one anxiety disorder (Kashani & Orvaschel, 1988; Kashani, Orvaschel, Rosenberg, & Reid, 1989), and that from 2% to 8% suffer from Major Depressive Disorder (Birmaher et al., 1996). These disorders are associated with significant impairment in social and school functioning (Essau, Conradt, & Petermann, 2000a, 2000b, 2000c; Nolen-Hoeksema, Girgus, & Seligman, 1992; Strauss, Frame, & Forehand, 1987), and appear to place individuals at greater risk for future difficulties. For example, childhood and adolescent anxiety and depression are prospectively associated with future anxiety and depression, suicidality, and poorer psychosocial functioning in adulthood (Harrington et al., 1994; Harrington, Fudge,

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Rutter, Pickles, & Hill, 1990; Weissman et al., 1999). In a 10- to 15-year follow-up study, Goldstein, Olfson, Wickramaratne, and Wolk (2006) found that young adults who had been diagnosed with depression and anxiety as children or adolescents exhibited poorer psychosocial functioning and were more likely to utilize mental health care than controls. Additionally, estimates based on epidemiological data suggest that the persistence of these problems in adulthood may ultimately result in a substantial cost to society (Greenberg et al., 2003; Greenberg et al., 1999).

Given the potential short- and long-term consequences of anxiety and depression among children and adolescents, it is important to identify groups that may be in greater need of psychiatric services. In particular, disparities in access to appropriate healthcare, as well as rates of various health concerns, among children and adolescents within certain racial groups has been well documented (Elster, Jarosik, VanGeest, & Fleming, 2003). However, with regard to psychiatric concerns, specifically depression and anxiety, racial differences in rates are equivocal. Additional research is therefore needed to examine the prevalence of various aspects of anxiety and depression in racially diverse samples as such examinations may represent important first steps in beginning to eliminate health disparities (Whitfield, Weidner, Clark, & Anderson, 2002). Once disparities between racial groups have been adequately documented, appropriate prevention and intervention efforts may be designed. In particular, for areas in which there are limited resources available, especially in rural and/or underserved areas (e.g., Angold et al., 2002), identification of children and adolescents at highest risk will help determine the most appropriate allocation of these scarce resources. The current investigation aims to do just this by examining racial differences in symptoms of anxiety and depression among three large, diverse cohorts of children attending elementary, middle, and high school in Mississippi, an underserved and understudied

population, particularly with regard to mental health concerns. Below we present a selected review of the limited extant literature regarding race-related differences in anxiety and depression in children and adolescents.

Racial Differences in Symptoms of Anxiety

Very few studies have examined racial differences in anxiety among children and adolescents. Among those that have, most have focused exclusively on children and have only assessed a narrow spectrum of anxiety symptoms. With regard to racial differences in the prevalence and severity of anxiety, the existing evidence is equivocal. In community samples, both Ollendick and colleagues (Ollendick, Yang, King, Dong, & Akande, 1996) and Shore and Rappaport (1998) found the lowest levels of self-reported fears among White children. By contrast, however, other studies have found no differences when comparing White and African-American children and adolescents on self-reported anxiety symptoms (Douglas & Rice, 1979), the prevalence of diagnosed anxiety disorders (Beidel, Turner, & Trager, 1994), or in the clinical characteristics of youth with anxiety disorders (Treadwell, Flannery-Schroeder, & Kendall, 1995). Furthermore, findings across specific anxiety disorders have also been mixed. Among a community sample of children and adolescents, Compton, Nelson, and March (2000) found that White respondents were more likely to be classified as high in social phobia and low in separation anxiety, whereas the opposite was true of African Americans. Compton and colleague (2000), however, found that White and African-American children and adolescents were equally likely to be classified as high in both social phobia and separation anxiety, or low in both social phobia and separation anxiety (Compton et al., 2000). Nonetheless, both Neal and Turner (1991) and Last and Perrin (1993) have reported higher rates of anxiety

disorders among African-American children than White children.

RACIAL DIFFERENCES IN SYMPTOMS OF DEPRESSION

Similar to anxiety, when considering racial differences in prevalence of depression symptomatology, the extant literature is largely ambiguous. Several studies have found differences in depression between African American and White adolescents, with some reporting higher levels of symptomatology among African Americans (Franko et al., 2005; Garrison, Jackson, Marsteller, McKeown, & Addy, 1990; Kistner, David, & White, 2003) and others reporting higher levels among White adolescents (Doerfler, Felner, Rowlison, Raley, & Evans, 1988). By contrast, three large-scale studies failed to find any racial differences in depression (D. A. Cole, Martin, Peeke, Henderson, & Harwell, 1998; Costello et al., 1996; Franko et al., 2004). Likewise, in a very large meta-analysis of 310 samples of children (n = 61,424) administered the Children's Depression Inventory (CDI; Kovacs, 1985), a widely used unidimensional child depression measure, Twenge and Nolen-Hoeksema (2002) found no differences between African American and White samples.

Potential Sources of Discrepancy

There are several possible explanations for the discrepant findings across previous studies, including differences in sampling, instrumentation, and analysis. For example, the inclusion of participants from different developmental periods may obscure or exaggerate differences that are unique to certain age groups. Indeed, studies suggest that the prevalence of specific depressive and anxiety disorders varies across childhood and adolescence (Breton et al., 1999; Last, Perrin, Hersen, & Kazdin, 1992). Thus, gaining a clearer understanding of racial disparities may require that symptom comparisons be made within more discrete developmental periods.

Differing instrumentation across studies may also lead to inconsistent findings. For example, a variety of depression measures were utilized in the studies previously cited, often generating dissimilar results. However, when only a single instrument was examined in Twenge and Nolen-Hoeksema's (2002) meta-analysis of 310 samples, no racial differences were found. Additionally, much of the extant literature has examined either prevalence rates of a specific depression or anxiety diagnosis or differences in severity on unidimensional scales of these constructs (typically depression). One potential problem with this approach is the well-established comorbidity between anxiety and depression (Angold, Costello, & Erkanli, 1999), with both sharing negative affectivity as a common underlying component (Chorpita, Albano, & Barlow, 1998; Mineka, Watson, & Clark, 1998). As such, one potential source of discrepancies observed in previous studies may be due, in part, to a lack of specificity among the measures used to assess the construct of interest. That is, previous findings regarding racial disparities may have less to do with the specific depression and anxiety constructs being measured and more to do with generalized negative affect. Few studies have utilized multidimensional measures that include indicators of both anxiety and depression, which allow for greater specificity in the examination of racial differences across various aspects of these disorders.

Differing analytic approaches may be yet another source of discrepancy. Previous studies have varied in their use of dichotomous (e.g., presence or absence of a diagnosis) or dimensional (e.g., symptom severity) outcomes. These approaches may yield different results, allowing one to draw disparate conclusions from the same data. Finally, another potential reason for the observed discrepancies is a lack of measurement equivalence. Measurement equivalence (or measurement invariance) refers to the ability

of a given measure to perform equally across groups (e.g., racial groups), and it plays a critical role in supporting the accuracy of inferences drawn from group comparisons. As researchers generally presuppose the equivalence of measures across groups (Knight & Zerr, 2010), disparate findings in the literature may be a result of between-group measurement variance that violates this assumption; that is, some instruments may not be assessing constructs in the same manner for White versus African-American respondents. It is therefore critical for investigations of racial differences to test for measurement invariance to ensure that findings are a result of true differences rather than measurement error (Knight & Hill, 1998). The preferred manner through which to test for measurement equivalence is confirmatory factor analysis because of the availability of multiple fit indices to determine whether model parameters differ across groups (Knight & Hill, 1998; Vandenberg & Lance, 2000). In fact, in a recent special section on measurement equivalence in child development research, Widaman, Ferrer, and Conger (2010) and Millsap (2010) describe confirmatory factor analysis as the "best practice" for evaluating factorial invariance across demographic groups. As such, examinations of differences between racial groups need to employ the statistical techniques necessary to ensure measurement equivalence.

CURRENT STUDY

The primary purpose of the current study was to examine the relationship of race to symptoms of anxiety and depression among three large, ethnically diverse, mixed-gender cohorts of elementary, middle, and high school students in Mississippi, a poor and underserved area of the Southern United States. As previous findings have been equivocal with regard to racial differences in the experience of anxiety and depression in children and adolescents, it is critical for

investigations to address the limitations of previous research, as discussed earlier. Such investigations will provide important information concerning the identification of those most in need of services, as well as potentially inform the development of specific, targeted prevention and early intervention efforts. Research in this area is particularly needed among children and adolescents in poor, rural, and underserved areas of the country, which have generally been understudied by psychopathology researchers. The state of Mississippi is one such area. Mississippi ranks last in the country on a combined index of longevity, knowledge, and income (the American Human Development Index; see Burd-Sharps, Lewis, & Martins, 2009); it also has the lowest educational attainment (see the 2000 Mississippi Human Development Report; Burd-Sharps et al., 2009) and the highest rate of children living below the poverty line (37%; see United States Census Bureau, 2007) in the United States. Thus, anxiety and depression research among children and adolescents in this state has the potential to speak to both the rates and associated demographics of these difficulties in an at-risk and underserved population.

In support of this primary goal, we also sought to address several issues that may be contributing to discrepancies in this body of literature. First, we collected data from three cohorts of elementary, middle, and high school students to examine racial differences in depression and anxiety within isolated developmental periods. Second, we administered the Revised Child Anxiety and Depression Scale (RCADS; Chorpita et al., 2000), a multidimensional measure that is widely used in both clinical and research contexts, and that has demonstrated an ability to discriminate between depression and anxiety when accounting for shared variance (Chorpita, Moffitt, & Gray, 2005). Further, unlike the measures used in many previous examinations of racial differences, the RCADS scales are DSM-based, allowing for comparisons across established diagnostic constructs. Third, we examined RCADS

scores from both a dichotomous (i.e., clinical cutoff) and dimensional (i.e., symptom severity) perspective, allowing for an examination of consistency across common analytic approaches. Finally, we employed a combination of manifest and latent variable statistical procedures to examine the potential role of measurement variance between racial groups. Specifically, we examined racial group differences dimensionally at the manifest level, and then confirmed these findings via confirmatory factor analytic procedures to ensure that the basic nature of the underlying constructs is invariant across racial groups (i.e., that they are true differences and not simply due to measurement error).

METHODS

Participants

Participants included 3,146 students from three cohorts (51.02% female) attending elementary school (grades 2-5; $n = 946$), middle school (grades 6-8; $n = 1,342$) and high school (grades 9-12; $n = 858$) across four districts throughout the state of Mississippi. Because of the nature of data collection procedures, individual participants' socioeconomic status was not obtained. Based on school and area records, the cohorts were diverse with regard to economic status, with the median household income of the areas from which participants were drawn ranging from $32,687 to $59,278, with an average of $38,017.13. Approximately half of participants were living in areas falling under the median state income of $36,424 and 88.4% were living in areas falling under the median U.S. income of $50,740 (United States Census Bureau, 2007). Further, an average of 67% of the students within each school were living below or within the poverty marker, as indexed by the percentage of students receiving free or reduced-fee lunches (Mississippi Office of Healthy Schools, 2009). For the

purposes of the current study, and because of the low numbers within racial groups other than White and African American (consistent with the general demographic make-up of the state; see United States Census Bureau, 2007), only White (61.35%; $n = 1930$) and African American (38.65%; $n = 1,216$) students were included. Self-reported demographic make-up of the three cohorts individually included: 48.31% female and 51.16% African American in the elementary school cohort; 50.60% female and 24.96% African American in the middle school cohort; and 54.66% female and 46.27% African American in the high school cohort.

Measures

Demographics. As part of a larger school-based survey on psychopathology in school children, participants reported on their race and gender.

Symptoms of Anxiety and Depression. Participants were administered the RCADS (Chorpita et al., 2000), a 47-item self-report questionnaire scored on a 4-point Likert-like scale (0 = never, 1 = sometimes, 2 = often, 3 = always). The RCADS consists of six scales, corresponding to DSM-IV dimensions of anxiety disorders and depressive disorder: Separation Anxiety Disorder (SAD), Generalized Anxiety Disorder (GAD), Social Phobia (SP), Panic Disorder (PD), Obsessive Compulsive Disorder (OCD), and Major Depressive Disorder (MDD). This factor structure has been confirmed via confirmatory factor analytic studies in large samples of children and adolescents (van Lang, Ferdinand, Oldehinkel, Ormel, & Verhulst, 2005). Individual RCADS scales have demonstrated good convergent validity with diagnostic interviews and self-report measures of their target constructs (Chorpita et al., 2005). Standardized t-scores may be calculated for each subscale, with $t > 70$ indicating clinically significant distress based on RCADS normative data. Internal consistencies (Cronbach's alpha) of

TABLE 1. Proportions of Boys with Clinically Significant Elevations (T > 70) on RCADS Scales

	SAD n (%)	GAD n (%)	PD n (%)	SP n (%)	OCD n (%)	MDD n (%)
Elementary School						
White (n = 235)	13 (5.53)	18 (7.66)	20 (8.51)	16 (6.81)	6 (2.55)	19 (8.09)
AA (n = 254)	10 (3.94)	22 (8.66)	19 (7.48)	11 (4.33)	17 (6.69)	12 (4.72)
Middle School						
White (n = 503)	7 (1.39)	1 (.20)	13 (2.58)	1 (.20)	2 (.40)	10 (1.99)
AA (n = 160)	2 (1.25)	0 (0)	4 (2.50)	0 (0)	0 (0)	0 (0)
High School						
White (n = 217)	10 (4.61)	0 (0)	7 (3.23)	0 (0)	3 (1.38)	3 (1.38)
AA (n = 172)	10 (5.81)	0 (0)	8 (4.65)	0 (0)	1 (.58)	2 (1.16)

Note. All racial differences are nonsignificant. AA = African American; RCADS = Revised Child Anxiety and Depression Scale; SAD = Separation Anxiety Disorder; GAD = Generalized Anxiety Disorder; PD = Panic Disorder; SP = Social Phobia; OCD = Obsessive Compulsive Disorder; MDD = Major Depressive Disorder.

scales in the current study were good to excellent across the three cohorts (ranging from .64 to .77, *Median* = .77 for the elementary school cohort, .75 to .86, *Median* = .86 for the middle school cohort, and .73 to .82, *Median* = .79 for the high school cohort).

Procedure

The University of Mississippi's and the Mississippi Children's Home Services' Internal Review Boards approved all study procedures. Schools were initially approached via an advertisement mailing, then by phone a short time later. In-person meetings with the research team were scheduled with institutions in which principals were interested in participating, wherein the study's purpose, instruments, and end products (including feedback to schools) were explained.

Prior to data collection, principals from each participating school mailed home an information letter concerning the study procedures. Parents were given the option to have their children opt out of participating by signing this letter and returning it to the school. Estimates provided by school administrators indicate that fewer than 5% of students in each school did not participate. Anonymous surveys were administered by teachers in all schools during regularly scheduled classes. For elementary school children

in the second and third grades, all questions were read aloud by their teachers.

Data Analysis

Data analysis was conducted in three phases. Each of the three cohorts was analyzed separately in order to test for racial differences within discrete developmental periods. Further, analyses within each cohort were stratified by gender to correspond with RCADS scoring procedures. Although this approach does not allow for direct testing of sex as a moderator, it is consistent with the standardized, widely used scoring procedures of the RCADS, which provide norms by sex and grade. The first phase used Fisher's exact test to compare the proportion of White versus African-American students reporting clinically significant distress (T > 70) on each RCADS scale. For each significant difference, we report an odds ratio (OR), a measure of effect size that represents the ratio of the odds of an outcome (e.g., depression) occurring in one group (e.g., African-American students) to the odds of it occurring in another group (e.g., White students). The second phase consisted of manifest level analyses in which group differences were examined via two-sample t-tests comparing groups on individual RCADS scales. For each comparison, we report Cohen's d, a measure of effect size

TABLE 2. Proportions of Girls with Clinically Significant Elevations (T > 70) on RCADS Scales

	SAD *n* (%)	GAD *n* (%)	PD *n* (%)	SP *n* (%)	OCD *n* (%)	MDD *n* (%)
Elementary School						
White (*n* = 227)	8 (3.52)	12 (5.29)	22 (9.69)	10 (4.41)	7 (3.08)*	20 (8.81)
AA (*n* = 230)	5 (2.17)	7 (3.04)	26 (11.30)	11 (4.78)	21 (9.13)	14 (6.09)
Middle School						
White (*n* = 504)	10 (1.98)	1 (.20)	17 (3.37)	1 (.20)	6 (1.19)	16 (3.17)
AA (*n* = 175)	0 (0)	0 (0)	2 (1.14)	0 (0)	0 (0)	0 (0)
High School						
White (*n* = 244)	7 (2.87)	0 (0)	16 (6.56)*	0 (0)	6 (2.46)	6 (2.46)
AA (*n* = 225)	4 (1.78)	0 (0)	2 (.89)	0 (0)	3 (1.33)	0 (0)

Note. *Significantly different from AA (*p* ≤ .01, Fisher's exact test). AA = African American; RCADS = Revised Child Anxiety and Depression Scale; SAD = Separation Anxiety Disorder; GAD = Generalized Anxiety Disorder; PD = Panic Disorder; SP = Social Phobia; OCD = Obsessive Compulsive Disorder; MDD = Major Depressive Disorder.

equal to the difference between the group means divided by the pooled standard deviation of the groups (see Tables 3 and 4).

For the third phase of analysis, we utilized multi-group confirmatory factor analysis (e.g., Byrne, Shavelson, & Muthén, 1989; French & Finch, 2006) for modeling invariance of means between racial groups using Mplus Version 5 statistical software (Muthén & Muthén, 1998-2007). We estimated latent factors for each of the RCADS scales using the manifest item data to identify the model. For each scale, three models were compared using the Bayesian information criterion (BIC) and Draper's information criterion (DIC), widely used model selection fit indices that have been shown to perform best across a range of conditions (Markon & Krueger, 2004). This approach to model selection involves the comparison of omnibus criteria (i.e., BIC, DIC) which value a model's goodness of fit and penalizes a model's complexity in the interest of achieving parsimony (Royle & Dorazio, 2009). The best fitting model is determined by comparing a series of models, as is done in the present set of analyses, based on these omnibus criteria. The best fitting model is determined based on the lowest value on these indices relative to the other models within each series of comparisons. As shown in Table 5, we compared the fit of the following models to determine whether there were significant differ-

ences based on race. The first model assumed race-related mean invariance. In this model, both latent means and observed variable intercepts were constrained between groups, indicating invariance at both the manifest and latent levels. The second model included race-related mean variance at the level of observed variables. In this model, latent means were constrained between groups and observed variable intercepts were allowed to vary, indicating that the race-related mean variance occurred at the manifest level but not at the level of the latent variable. Such a finding would indicate the measurement properties of the scales are different for the two groups but that there are no true differences on the latent factors. The third model included race-related mean variance at the level of latent factors. In this model, observed variable intercepts were constrained while latent means were allowed to vary, indicating that the race-related mean variance occurred at the level of the latent factors and was not due to differential measurement for the White and African-American groups. All other parameters including residual variances and factor loadings were allowed to vary for all three models. We report effect size estimates for latent-level group analysis based on a standardized metric.

TABLE 3. T-Tests Comparing White and African-American Boys on RCADS Scales

RCADS Scales	Total M (SD)	White M (SD)	AA M (SD)	t	Cohen's d
Elementary School					
SAD	4.66 (3.86)	4.46 (4.02)	4.85 (3.71)	1.10	.10
GAD	6.70 (4.03)	6.28 (3.97)	7.09 (4.05)	2.24	.20
PD	5.65 (4.50)	5.14 (4.53)	6.12 (4.43)	2.41	.22
SP	8.89 (5.26)	8.63 (5.55)	9.13 (4.98)	1.05	.09
OCD	6.25 (3.69)	5.66 (3.57)	6.80 (3.72)	3.44*	.31
MDD	8.69 (4.71)	8.57 (4.70)	8.80 (4.73)	.55	.05
Middle School					
SAD	1.12 (2.20)	1.12 (2.29)	1.13 (1.92)	.01	.00
GAD	1.53 (2.42)	1.45 (2.31)	1.81 (2.71)	1.65	.14
PD	1.52 (2.96)	1.46 (3.03)	1.72 (2.73)	.95	.09
SP	2.77 (3.53)	2.85 (3.71)	2.50 (2.91)	-1.10	-.10
OCD	1.57 (2.46)	1.49 (2.43)	1.84 (2.56)	1.59	.14
MDD	2.02 (3.41)	2.09 (3.58)	1.81 (2.78)	-.90	-.09
High School					
SAD	1.27 (2.52)	1.11 (2.32)	1.48 (2.75)	1.44	.15
GAD	1.76 (2.49)	1.72 (2.59)	1.80 (2.38)	.31	.03
PD	2.06 (3.40)	1.85 (3.23)	2.34 (3.61)	1.39	.14
SP	2.92 (3.56)	2.95 (3.60)	2.87 (3.52)	-.23	-.02
OCD	1.50 (2.31)	1.44 (2.38)	1.58 (2.23)	.59	.06
MDD	2.35 (3.46)	2.39 (3.51)	2.31 (3.40)	-.22	-.02

Note. *p < .01. M (SD) = Mean (Standard Deviation); t = t-statistic of two-sample t-test; Cohen's d = effect size. AA = African American; RCADS = Revised Child Anxiety and Depression Scale; SAD = Separation Anxiety Disorder; GAD = Generalized Anxiety Disorder; PD = Panic Disorder; SP = Social Phobia; OCD = Obsessive Compulsive Disorder; MDD = Major Depressive Disorder.

RESULTS

Missing Data

Participants missing responses on more than 10% of RCADS items were excluded, resulting in the loss of 0 elementary school, 12 middle school, and 14 high school students. For all remaining participants, missing values were estimated using the multiple imputation program in SAS Version 9.2 (SAS Institute, 2008). This approach uses maximum likelihood estimates for missing data and includes a random error component to prevent artificial inflation of item intercorrelations.

Clinical Elevation Analyses

Because of the multiple comparisons in each sample, for analyses comparing the proportions of White and African-American students reporting clinically significant distress on RCADS scales (t > 70), we selected a more conservative alpha level than the conventional .05. Specifically, consistent with conventions in the field, we selected an alpha level of .01 on which to base statistical significance in order to guard against Type I errors without inflating the Type II error rate. For boys (Table 1), there were no racial differences in clinical elevations among elementary, middle, or high school students. Among girls (Table 2), a significantly larger proportion of African-American elementary school students had a clinical elevation on OCD (p = .01, Fisher's exact test; OR = 3.16). There were no racial differences among middle school students. Among high school students, White girls were significantly more likely to have a clinical elevation on PD (p = .001, Fisher's exact test; OR = 7.83).

TABLE 4. T-Tests Comparing White and African-American Girls on RCADS Scales

RCADS Scales	Total *M* (*SD*)	White *M* (SD)	AA *M* (*SD*)	*t*	Cohen's *d*
Elementary School					
SAD	6.34 (4.09)	6.54 (4.10)	6.15 (4.09)	-1.03	-.10
GAD	7.88 (4.25)	7.45 (4.31)	8.29 (4.17)	2.11	.20
PD	7.40 (5.43)	6.83 (5.42)	7.97 (5.39)	2.25	.21
SP	11.31 (5.72)	11.60 (5.81)	11.02 (5.63)	-1.09	-.10
OCD	7.03 (4.16)	6.25 (4.06)	7.80 (4.12)	4.05**	.38
MDD	9.78 (5.18)	9.33 (5.38)	10.22 (4.95)	1.83	.17
Middle School					
SAD	1.50 (2.49)	1.44 (2.55)	1.65 (2.32)	.95	.09
GAD	2.80 (3.43)	2.70 (3.43)	3.09 (3.41)	1.30	.11
PD	2.36 (3.75)	2.35 (3.91)	2.40 (3.26)	.16	.01
SP	4.45 (4.62)	4.62 (4.70)	3.95 (4.37)	-1.64	-.15
OCD	2.14 (2.85)	1.96 (2.84)	2.64 (2.81)	2.73*	.24
MDD	2.75 (4.08)	2.86 (4.36)	2.41 (3.14)	-1.49	-.12
High School					
SAD	1.16 (2.06)	1.11 (2.14)	1.21 (1.98)	.54	.05
GAD	2.72 (3.07)	2.57 (3.03)	2.88 (3.11)	1.06	.10
PD	2.49 (3.52)	2.74 (4.12)	2.23 (2.71)	-1.60	-.15
SP	4.04 (3.85)	4.52 (4.10)	3.52 (3.50)	-2.86*	-.26
OCD	1.90 (2.60)	1.88 (2.68)	1.92 (2.51)	.18	.02
MDD	2.75 (3.61)	2.99 (4.20)	2.49 (2.83)	-1.50	-.14

Note. *p < .01, **p ≤ .001. *M* (*SD*) = mean (Standard Deviation); *t* = t-statistic of two-sample t-test; Cohen's *d* = effect size. AA = African American; RCADS = Revised Child Anxiety and Depression Scale; SAD = Separation Anxiety Disorder; GAD = Generalized Anxiety Disorder; PD = Panic Disorder; SP = Social Phobia; OCD = Obsessive Compulsive Disorder; MDD = Major Depressive Disorder

Manifest-Level Analyses

As stated above, statistical significance was based on an alpha level of .01. For boys, two-sample *t*-tests examining individual RCADS scales (Table 3) indicated that, among elementary school students, African-American boys scored significantly higher on OCD. There were no significant racial differences on RCADS scales among middle or high school students. Effect sizes for group differences on the OCD scale were small.

Among girls, two-sample *t*-tests examining individual RCADS scales (Table 4) indicated that, among elementary and middle school students, African-American girls scored significantly higher on OCD. Among high school students, White girls scored significantly higher on SP. Effect sizes for all group differences were small.

Mean-Level Invariance Analyses

To confirm that manifest-level findings were a result of true differences between groups on the various constructs rather than measurement-related differences, mean-level invariance analyses were performed as described above. As indicated by the model fit statistics (see Table 5), the models in which observed variable thresholds were constrained while latent means were allowed to vary between groups was optimal for all analyses, confirming the validity of the manifest-level findings. As noted earlier, this indicates that race-related mean variance for (a) OCD among elementary schools boys and elementary and middle school school girls, and (b) SP among high school girls occurred at the level of the latent factors. These differences were not due to different scale measurement for the White and African-American groups.

TABLE 5. Fit Indices for Mean-Level Invariance Models

Model	χ^2	$ln\,(L)$	k	BIC	DIC
Boys					
Elementary-School					
Obsessive Compulsive Disorder					
Latent means and observed thresholds equal	7268.12	-3829.17	31	7751.52	7793.33
Latent means equal, observed thresholds differ	7001.12	-3812.08	49	7771.46	7837.53
Latent means differ, observed thresholds equal*	6645.10	-3823.53	32	7743.25	7786.40
Middle-School					
No significant manifest-level findings.					
High-School					
No significant manifest-level findings.					
Girls					
Elementary-School					
Obsessive Compulsive Disorder					
Latent means and observed thresholds equal	6871.68	-3660.13	31	7411.60	7453.15
Latent means equal, observed thresholds differ	6534.37	-3634.21	49	7412.81	7478.47
Latent means differ, observed thresholds equal*	6925.27	-3653.13	32	7400.56	7443.44
Middle-School					
Obsessive Compulsive Disorder					
Latent means and observed thresholds equal	2091.45	-2868.65	31	5840.02	5882.46
Latent means equal, observed thresholds differ	1850.82	-2844.62	49	5853.17	5918.69
Latent means differ, observed thresholds equal*	1962.71	-2859.55	32	5826.16	5868.95
High-School					
Social Phobia					
Latent means and observed thresholds equal	4438.43	-3351.74	44	6834.47	6893.24
Latent means equal, observed thresholds differ	4306.59	-3324.22	69	6853.84	6946.02
Latent means differ, observed thresholds equal*	4198.26	-3349.39	45	6832.74	6892.85

Note. *Best fitting model determined via lowest value on the omnibus criteria as described in the text. ln(L) = log-likelihood. k = number of parameters. BIC = Sample Size Adjusted Bayesian Information Criterion. DIC = Draper's Information Criterion.

At the latent variable level, effect sizes of differences between the two racial groups were small: .42 for OCD among elementary school boys, .45 and .43 for OCD among elementary and middle school girls, respectively, and .26 for SP among high school girls.

DISCUSSION

The current investigation found modest, statistically significant racial differences in symptoms of anxiety, but not depression, among elementary, middle, and high school students from Mississippi. Specific differences varied across the three developmentally distinct cohorts and depending on whether data were examined categorically (using clinical cut-offs) or dimensionally. Significant manifest-level findings were then confirmed through tests of measurement equivalence. The results highlight important methodological considerations in conducting research on mental health disparities in children and adolescents. In particular, variations in sampling (e.g., participant age) and analytic approach are likely to impact the identification of at-risk youth. Consideration must also be given to both the magnitude of any observed effects and measurement properties of the instrument being used.

In the current study, when racial groups were compared based on percent falling in the clinically significant range, no group differences were found among boys. However, a significantly higher proportion of elementary school African-American girls

fell in the clinically significant range for OCD and a significantly higher proportion of White high school girls fell in the clinically significant range for PD. In other words, when clinical cut-offs were used, racial differences emerged only for girls, with African-American elementary school girls reporting more clinically significant levels of intrusive and distressing thoughts and ritualized behavior (OCD) and White high school girls reporting more clinically significant levels of fear or discomfort accompanied by physical and cognitive symptoms of worry (PD).

When RCADS scales were examined dimensionally, a somewhat different picture emerged. Consistent with the categorical analyses, racial differences were again most prominent among girls; however, a wider range of racial differences were observed. Specifically, African-American elementary and middle school girls scored higher than their White counterparts on OCD, but White high school girls scored higher on SP. For boys, African-American elementary school boys scored significantly higher on OCD than their White counterparts. That is, African-American elementary school boys and girls and middle school girls reported significantly more symptoms of OCD than their White counterparts while White high school girls reported significantly more symptoms concerned with excessive worrying about evaluative concerns (SP). The dimensional results were subsequently confirmed at the latent variable level using multiple group confirmatory factor analysis, suggesting that the manifest level results cannot be attributed to differential measurement of constructs in the two racial groups. Thus, our findings appear to reflect true differences between groups, rather than a racial bias in the measurement properties of RCADS scales. With regard to depression, we did not find racial differences in any of the three cohorts on the MDD scale, consistent with previous large-scale studies (e.g., D. A. Cole et al., 1998; Costello et al., 1996; Franko et al., 2004).

Among girls, a potential developmental pattern also emerged from these findings with African-American students reporting greater levels of some anxiety symptoms in elementary and middle school and White students reporting greater levels in high school. One potential explanation for this finding may be that African-American students begin to exhibit symptoms of certain anxiety disorders (e.g., OCD) earlier than White students, but that Whites eventually catch up by high school. At the same time, it may be that other anxiety disorders (e.g., PD, SP) emerge later in adolescence, particularly for Whites (e.g., Beidel et al., 1994). In fact, Whites have been shown more likely not only to be diagnosed with SP, but also to report more social distress (Beidel, Turner, Hamlin, & Morris, 2000) and to have higher rates of PD, panic attacks, and panic symptoms (Asnaani, Gutner, Hinton, & Hofmann, 2009). However, given that RCADS scores appear to decrease after elementary school (Tables 3 and 4), it may be that African-American students exhibit a decrease in anxiety as they progress through middle and high school, particularly OCD symptoms, ultimately reaching the relatively lower levels of their White counterparts. Another possible explanation for the age-related findings among girls may be that African-American students experiencing high levels of distress are more likely to drop out of school, leading to fewer distressed African-American students in high school. In fact, in the state of Mississippi, a significant racial gap in graduation rates for African-American and White students exists; the state's graduation rate is 63.3% for Whites but only 52.6% for African Americans (see Orfield, Losen, Wald, & Swanson, 2004). Given limitations in the available data, these potential explanations are largely speculative, and they admittedly do not account for the broad range of factors that might contribute to developmental discrepancies in self-reported symptomatology. Whatever the reason for these findings of age-related differences, the common practice of combining participants from different developmental periods may be partly respon-

sible the inconsistent findings reported in this literature.

Despite the indication of modest racial differences in symptoms of anxiety across multiple levels of analysis, interpretations of these findings must take several factors into account. First, the effect sizes for all group differences were small, suggesting that the statistically significant elevations in anxiety among African-American elementary and middle school students and White high school students may be of limited practical or clinical significance. This is particularly important when such findings are used to inform policy decisions and outreach efforts, as a reliance on statistical significance alone might lead to a misallocation of resources. Second, these findings should be regarded as instrument-specific. While our results support the measurement equivalence of certain RCADS scales across African-American and White students, it should not be presumed that other measures of those constructs are similarly invariant. For example, previous studies have found evidence of psychometric bias on other measures of OCD-related phenomena among African-American and White respondents (Thomas, Turkheimer, & Oltmanns, 2000; Williams, Turkheimer, Schmidt, & Oltmanns, 2005). Additionally, it is important to note that although the RCADS is a DSM-IV-based instrument that shows strong convergence with structured diagnostic interviews, scores on the RCADS reflect symptoms of the target disorder but are not diagnostic. Third, it should be noted that t-score calculations were based on the RCADS normative sample, which included very few African Americans. Furthermore, while t-scores are calculated based on gender and age specific norms, race is not considered. Therefore, the appropriateness of such norms in African American samples is not clear.

Fourth, our findings of measurement invariance do not necessarily suggest that ethnic or cultural factors had no impact on item responses, but only that the scales appear to be measuring the same constructs across groups. Indeed, a recent study of university students and adult community participants found, for example, that African Americans scored higher than Whites on OCD scales measuring pathological fear of contamination but that these differences disappeared when accounting for differences in attitudes about cleanliness (Williams & Turkheimer, 2007). Additionally, self-reported psychiatric symptoms may be influenced by cultural differences in emotion socialization, including the acceptability of expressing negative emotions, and parental modeling of emotion management and regulation strategies (e.g., P. M. Cole, Tamang, & Shrestha, 2006). Thus, cultural norms should be considered in the interpretation of racial differences across psychological constructs.

Fifth, results may not be generalizable to students beyond these selected school districts in Mississippi. Although our three cohorts represent distinct developmental age groups, the cross-sectional design limits developmental interpretations of the data; therefore, the discrepant racial differences observed across elementary , middle , and high school may be a result of variables other than age and gender, such as district-specific factors. For example, as stated previously, RCADS scores in our middle and high school cohorts were substantially lower than scores in our elementary school cohort, a finding that may reflect a response bias among the younger students. Previous research suggests that children are more likely to select extreme responses on scaled items inquiring about subjective experiences, such as emotional states (Chambers & Johnston, 2002). Indeed, an examination of the item responses in our elementary cohort reveals a distribution that is approximately bimodal. By comparison, item responses among middle and high school students follow a more normal distribution. On the other hand, the RCADS scores from our middle and high school cohorts appear to be much lower than those reported among students of the same age in a previous RCADS study (Chorpita et al., 2000), while the scores of the elementary

school cohort appear to be more consistent with findings from that same study. Although the extant literature does include longitudinal studies finding various trajectories, no study to date has examined trajectories across the developmental stages examined in the present investigation. Thus, it is not clear whether this pattern reflects factors that are unique among our middle and high school cohorts, or among adolescents in that specific geographic area, or is reflective of a more generalizable developmental trajectory.

Additionally, as noted above, the current findings are based on a self-administered measure of anxiety and depression symptomatology, rather than structured clinical interviews. Although this is may not be the optimal approach to assessment, the majority of similar studies have also relied on self-administered instruments. Finally, because of the nature of data collection procedures, individual participants' socioeconomic status was not obtained. As race and socioeconomic status are often confounded (LaVeist, 2005), it is imperative that this limitation be addressed in future investigations to more fully elucidate the role of race in mental health disparities.

Limitations notwithstanding, this line of research represents an important step in the effort to identify, understand, and eliminate mental health disparities (Whitfield et al., 2002). Effective prevention and intervention efforts will likely be enhanced through the identification of vulnerability factors that distinguish at-risk groups. Specifically, more complex analyses that include not only race, but also variables such as broader demographic, social, cultural, biological, and personality characteristics must be examined to determine their direct, indirect, and interactive effects on mental health. The current study suggests that race alone (i.e., as a simplified, categorical construct), may be of limited importance in developing comprehensive etiological models of anxiety and depression among youth. However, replication is needed to confirm the veracity of these findings.

CONCLUSIONS

In sum, the current study found several statistically significant, albeit modest, racial differences in symptoms of anxiety, but not depression, among three cohorts of youth from the Southern United States. The most consistent racial disparity was on the OCD scale, with African-American students in general, and girls in particular, reporting greater difficulties in this domain. It will be important for future research to examine factors that might be contributing to the gender differences observed in the current examination. For example, subsequent studies should examine whether these findings are a result of contextual factors, such as greater exposure to environmental stressors (e.g., Nolen-Hoeksema, 2001). Nonetheless, when considering these findings, it is important to note that all racial differences observed in the current study, regardless of analytic approach, may be of limited clinical significance. Given the potential for health disparities research to shape policy decisions and inform efforts to improve school resources and educational attainment, it is crucial to consider the magnitude of group differences.

More important than the modest racial differences observed, perhaps, are the findings related to measurement and methodology. First, the manifest-level dimensional results were confirmed at the latent variable level, supporting the measurement equivalence of those RCADS scales among the White and African-American respondents. Second, the emergence of racial differences varied as function of how the data were analyzed, suggesting that dichotomous and dimensional representations of such data may yield somewhat different results. It is therefore critical for researchers to recognize the alternative conclusions that may emerge from examining data in these different ways. When deciding upon analytic approaches to psychopathology data, researchers ought to consider the larger literature on the nature and classification of mental disorders. For

example, a large body of research supports the conclusion that psychopathology is best understood as continuous in nature and that mental disorders, per se, do not delineate highly discrete and distinguishable categories (Krueger & Markon, 2006). While either approach may be appropriate depending on the research question, it is important to recognize that reliance on one or the other may lead to differing conclusions.

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