

Anxiety and Aggression in Rural Youth: Baseline Results from the Rural Adaptation Project

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Abstract There is little research on the prevalence of and risk factors for mental health disorders, including anxiety and aggression, for low income, rural youth. The research that does exist suggests that rural youth may be at increased risk for negative outcomes, including low educational achievement, drug use and possession of weapons among gang members, and alcohol use. Using multilevel logistic regression, we examined individual, family, and school risk and protective factors for adolescent anxiety and aggression in a large, racially diverse sample of 4,321 middle school students who came from two impoverished, rural counties in a Southeastern state. Parent–child conflict, negative peer relationships, and negative friend behaviors were key risk factors associated with both anxiety and aggressive behaviors. The teacher turnover rate at school was also associated with both anxiety and aggression. Significant direct effects, cross-level moderation effects, and implications for prevention programming were discussed.

Keywords Rural · Adolescents · Risk and protective factors · Anxiety · Aggression

Anxiety and aggression each constitute a significant concern in adolescence. It is estimated that by age sixteen, 9.9 % of adolescents will meet diagnostic criteria for anxiety and 23 % will meet criteria for a behavior disorder [1]. Although aggression is not necessarily present in a

behavior disorder, behavior disorders often involve aggressive acts, such as destruction of property and harm towards others [2].

While anxiety and aggression have traditionally been studied separately as two distinct problems, researchers have begun to theorize that anxiety may motivate aggressive behaviors [3]. In fact, several empirical studies have linked anxiety and aggression [3–6]. For example, one study found an association between anxiety and reactive relational aggression, which is defined as aggression intended to harm others through social relationships in response to a threat [3]. Similarly, another study found that reactively aggressive children were significantly more anxious than non-aggressive children [6]. In a longitudinal study of elementary school students, the strongest predictor of internalizing difficulties was the combination of relational and physical aggression [4]. This body of research provides rationale for the simultaneous investigation of anxiety and aggression. The two constructs may be inter-related coping reactions within the ecological system when youth respond to stress and strain. For example, in Strain Theory put forth by sociologists Merton and Durkheim and subsequently revised by Agnew, both structural and interpersonal goals and expectations may generate emotional responses (e.g., anxiety, frustration, anger) which lead to negative behaviors (e.g., aggressive behavior, delinquency) when positive strategies for reaching goals are blocked. This theoretical link provides impetus for studying the relationship between anxiety and aggressive behavior within stressful environments.

There is little research on the prevalence of, and risk factors for, mental health disorders, including anxiety and aggression, for low income, rural youth [7, 8]. However, available research highlights increased risk for negative outcomes among socioeconomically disadvantaged youth

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[9] and rural youth [10], suggesting that this population may be particularly vulnerable to anxiety and aggression. Examining how the multiple environmental contexts such as family, peer group, school, and neighborhood (e.g., ecological, structural, and interpersonal factors that set social goals and expectations) effect rural youths' anxiety and aggression may help illuminate the nature of mental health issues in this vulnerable and understudied population.

Literature Review

Ecological Theory

Bronfenbrenner's Ecological Theory [11] underlines the importance of viewing human development in the context of multiple environments. Although this theory organizes the environment in terms of micro-, meso-, macro- and chrono-systems, proximal processes (i.e. interactions) in the microsystem [12] are particularly salient to understanding adolescent mental health. Adolescent development is directly impacted by the microsystems within the immediate environment that includes family, peer group, and school [12]. The ability for youth to successfully interact across these multiple contexts decreases the likelihood of feeling overwhelmed and helpless [13]. This suggests that positive relationships with multiple microsystems may translate into decreased levels of anxiety and aggression. It is also important to consider the overarching macrosystem in which these microsystems operate. A macrosystem refers to social beliefs and norms [14] in a specific context. For example, in the current study, the macrosystem is the rural community in which the study takes place.

Ecological theory is a natural fit with Strain Theory: both suggest that macrosystem goals and expectations may cause stress for microsystem interpersonal interactions. This macro- to microsystem transfer of stress and strain may subsequently trigger emotional coping responses seen in anxiety and ultimately lead to negative behavioral outcomes such as aggressive behavior. Consequently, for the current study, it is critical to examine the unique characteristics of the rural macrosystem and interpersonal microsystem that may influence anxiety and aggression.

Rural Youth

One potential pathway through which the rural macrosystem may impact adolescent anxiety and aggression is through the stigma associated with utilization of mental health services. Rural families oftentimes face barriers in accessing mental health services due to the stigma present

in rural communities [15]. This underscores the importance of identifying predictors associated with anxiety and aggression in rural adolescents.

While there is ample research examining anxiety and aggression in urban adolescents, research on rural youth is lacking [7, 8]. However, the research that does exist suggests that rural youth may be at increased risk for negative outcomes, including low educational achievement [16], drug use and possession of weapons among gang members [17], and alcohol use [18]. One group of researchers found that compared to their urban counterparts, rural youth experienced increased cumulative microsystem risk at the individual (i.e. problem behaviors, parent-child conflict, parent-child bonding) and family levels (i.e. financial stress, child management, involvement in religious activities, academic expectations) [10]. Similarly, researchers specifically interested in mental health found that rural youth were more likely to have a family history of sexual abuse and mental illness and to report more internalizing and externalizing behaviors [19].

Microsystem Risk Factors Associated with Anxiety and Aggression

A considerable amount of research has identified important microsystem predictors of anxiety and aggression in the general adolescent population. Family characteristics such as early motherhood, family conflict, severe punishment, and child maltreatment have been associated with increased risk for anxiety and aggression [20–24]. Additionally, anxious adolescents were more likely to come from families characterized by low maternal educational achievement, below-average living standards, parental history of alcohol abuse [24], and parental anxiety disorder [25]. For aggression, parental criminality [26] and poor parental monitoring [20] have also been identified as risk factors. One study found that family socioeconomic status was associated with anxiety independent of intelligence and parental psychopathology [27]. The inverse relationship between socioeconomic status and externalizing behaviors, including aggression, is evident in early childhood and remains consistent through middle childhood [28–30].

It is commonly suggested that the influence of socioeconomic status on child mental health operates at multiple levels [31]. Not only does a family's socioeconomic status impact a child directly, but the socioeconomic status of a child's neighborhood is also associated with mental health outcomes, including aggression and anxiety [31]. For example, one study found that African American children living in middle-SES neighborhoods displayed lower levels of peer-reported aggression compared to those living in low-SES neighborhoods [32]. School-level factors within

the macrosystem, including classroom and school environments, also appear to impact aggression [33]. Additionally, deviant peer involvement has been associated with anxiety [24].

Individual Risk Factors

In addition to microsystem risk factors, individual characteristics are also associated with anxiety and aggression. Researchers have suggested that females are at increased risk for anxiety [24], while males are at increased risk for aggression [(34, 35), see (36) for a review]. Other individual risk factors associated with anxiety include: having experienced contact sexual abuse, depression, conduct disorder, alcohol abuse, neuroticism, and lower IQ scores [24]. Additionally, socioeconomic status has been linked to both anxiety and aggression in youth [9, 37, 38].

Based on ecological and strain theories, we made the following hypotheses: (1) sources of social strain will be related to higher anxiety and aggressive behavior in youth; (2) proximal microsystem influences, particularly parents and then peers, will display strong links to adolescent mental health; (3) distal macrosystem influences, such as school characteristics, will have less impact on adolescent mental health, however, these influences will be moderated by salient microsystem factors, forming complex cross-level interactions.

Methods

Current Study

Data for this investigation came from the Rural Adaptation Project, a longitudinal study following rural adolescents from middle school into high school. Funding came from the United States Centers for Disease Control and Prevention through a cooperative agreement with the North Carolina Academic Center for Excellence in Youth Violence Prevention. Baseline data was collected in the Spring of 2011. Using an ecological framework, the aim of this study was to assess the prevalence of anxiety and aggression of youth in a rural, low-income, ethnically diverse community and to identify the demographic, social, and school factors associated with anxiety and aggression in this population. It was hypothesized that positive relationships between youth, their microsystems (i.e. family and peers), and macrosystems (i.e., schools and neighborhood) would yield lower levels of anxiety and aggression.

The participants in this study ($N = 4,321$) came from two impoverished, rural counties in a Southeastern state. The sample consisted of an approximately equal proportion of males (47 %) and females (53 %) in grades 6 through 8.

Participants were racially diverse: 28 % identified as American Indian/Native American, 22.5 % as White, 22 % as African American, 12 % as Latino/Hispanic, and 11 % as Mixed race or "Other." Sixty-six percent of the participants received free or reduced price lunch. Additional information on the sample is displayed in Table 1. The sample has outstanding external validity to the population of middle school students in these two counties. In County 1, the sample included all middle school students (i.e., a complete census) in public schools. In County 2, a random sample of 50 % of public middle school students was included in the assessment.

Measures

The School Success Profile (SSP) [39] is a 220 item youth self-report survey that measures attitudes and perceptions about school, friends, family, neighborhood, self, and health/wellbeing. The SSP fit well with ecological theory as it provides a comprehensive assessment of adolescent micro- and macrosystem characteristics. The reliability and validity of this survey has been established after extensive empirical testing [40]. The current study used a modified version of the SSP, the SSP + , which includes the original SSP items that assess students' perceptions of school, friends, family, neighborhood, and self. In addition, subscales from the Youth Self Report [YSR: the adolescent version of the Child Behavior Checklist (CBCL)] [41] were used to measure anxiety and aggressive behavior. The Multigroup Ethnic Identity Measure (MEIM) [42] was used to measure ethnic identity, and the Conflict Behavior Questionnaire [43] was used to measure parent-child conflict. Each measure is described in detail below.

Demographics

Age was measured in years. Receipt of free or reduced price lunch was used to measure socioeconomic status (Yes was coded as 1 and 0 was coded as No). Race/ethnicity was coded as four dichotomous variables, and Caucasian students were the reference group. For gender, male was coded as 0 and female was coded as 1.

Dependent Variables

Due to limited space in this large-scale survey, the *YSR Anxiety scale-modified* used 3 items from the original Anxiety subscale from the YSR [41]. This scale was measured on a 3-point Likert scale (0 = "Not like me," 1 = "A little like me," and 2 = "A lot like me") and had a reliability of .76. The scale items were: "I often worry about my future," "I often feel nervous or tense," and "I often feel fearful or anxious." The 12 item *YSR Aggression*

Table 1 Sample descriptive statistics and model-estimated odds ratios

Variable	Model of high anxiety			Model of high aggression		
	Descriptives		Odds ratio	Descriptives		Odds ratio
	Mean	SD		Mean	SD	
Student demographics	12.840	1.064	0.990	12.841	1.064	0.989
Age						
Gender (male)						
Female	0.532	0.499	1.472***	0.533	0.499	1.385**
Use free or reduced lunch (no)						
Yes	0.667	0.471	1.266**	0.666	0.472	1.142
Race (white)						
Hispanic	0.123	0.329	0.942	0.124	0.329	1.034
African American	0.223	0.416	0.888	0.223	0.417	0.970
American Indian	0.282	0.450	0.810	0.282	0.450	1.120
Mixed race or other	0.111	0.314	0.881	0.110	0.313	1.328
Individual student factors						
Ethnic identity	3.399	0.997	1.224**	3.401	0.996	1.060
Religious Orientation	2.339	0.660	0.905	2.339	0.659	0.959
Discrimination Experiences	1.445	0.546	1.119	1.445	0.546	0.923
School Satisfaction	2.369	0.484	0.767*	2.369	0.484	0.421***
Social relationship factors						
Parent-child Conflict	0.209	0.251	8.556***	0.209	0.252	11.964***
Negative peer relationships	1.297	0.354	4.081***	1.297	0.354	2.425***
Negative friend behaviors	1.396	0.443	1.398**	1.396	0.443	3.952***
Friend support	2.488	0.553	0.873+	2.487	0.554	1.108
Teacher support	3.169	0.562	1.164+	3.169	0.563	1.132
Parent support	2.679	0.493	1.019	2.677	0.495	1.173
Neighborhood support	3.031	0.604	0.894	3.030	0.605	0.871
School aggregated characteristics						
School size	511.070	235.575	1.000	511.172	235.467	1.000
% Students at or above grade level in reading	57.807	9.226	0.987	57.804	9.233	0.997
% Students at or above grade level in math	75.277	6.948	1.017	75.285	6.946	0.995
Teacher turnover rate (%)	11.293	8.713	0.965*	11.277	8.691	0.962*
Teachers with advanced degrees (%)	23.156	8.445	1.004	23.162	8.437	1.027**
% White students	26.995	23.590	0.999	26.971	23.573	0.977*
% African American students	30.374	20.249	1.003	30.361	20.234	1.008

Table 1 continued

Variable	Model of high anxiety			Model of high aggression		
	Descriptives		Odds ratio	Descriptives		Odds ratio
	Mean	SD		Mean	SD	
% Hispanic students	9.164	9.790	1.003	9.152	9.769	1.022
% American Indian students	32.013	30.228	1.015*	32.050	30.226	0.998
% Using free or reduced lunch	65.614	11.190	0.999	65.611	11.185	0.994
% Teachers with 4–10 years experiences	28.758	9.267	1.011+	28.778	9.280	0.992
% Teachers with 10 + years experiences	51.152	14.142	1.002	51.145	14.135	1.000
Cross-level interaction						
”Discrimination experiences” by ”teacher turnover rate”	16.408	14.864	1.021*	16.392	14.846	1.020*
”Ethnic identity” by “ % American Indian students”	109.799	114.353	0.997**			
”Negative friend behaviors” by “ % white students”				37.193	34.477	1.011*
”Ethnic identity” by “ % hispanic students”				30.995	35.419	0.989*
N			3405			3405
Pseudo R-square			0.158			0.282
Model Chi-square (df)			721.30(32)***			1,040.02(33)***

Reference groups for indicator variables are shown in the parentheses

*** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .1$, two-tailed test

scale-modified was a modified version of the YSR Externalizing subscale [41], was scored on the same 3-point Likert scale, and had a reliability of .85. Examples of the scale items were: “I get in many fights,” “I have a hot temper,” and “I break rules at home, school, or elsewhere.” The rigorously tested Youth Self Report has been used extensively with a variety of different communities [44]. This measure has been the “gold standard” in child mental health research. Thousands of studies have established its reliability and validity [41, 44]. Given non-normal distributions, dichotomous variables were created to capture high versus low levels of anxiety and aggression using the midpoint (1.5) as a cutoff score. Details about the lack of normality (i.e., histograms, measures about skewness and kurtosis) are available per request.

Individual level predictors

Ethnic Identity was measured using a modified version of the Multigroup Ethnic Identity Measure (MEIM) [42], which included six items with a reliability of .92. Examples of the scale items were: “I feel a strong attachment towards my own ethnic group” and “I have often done things that will help me understand my ethnic background better.” This scale is commonly used to measure ethnic identity and has high reliability and validity [45]. The 3 item *Religious Orientation* scale [39] measured the importance of religion in the youths’ lives, was rated on a 3-point Likert scale, and had a reliability of .89. The scale items were: “My religious faith gives me strength,” “Religion plays an important role in my daily life,” and “My religious faith influences the decisions that I make.” The adequately reliable and valid [46] 3-item *Perceived Discrimination* scale [47] measured the perceived frequency of unfair treatment due to race/ethnicity, was rated on a 4-point Likert scale, and had a reliability of .70. One scale item was: “How often do people dislike you because of your race/ethnicity?” The other two items asked adolescents about unfair treatment they or their friends had experienced because of their race/ethnicity. The 7 item *School Satisfaction* scale [39] was measured on a 3-point Likert scale and had a reliability of .84. Examples of the scale items were: “I feel close to other students at this school,” “I get along well with teachers at this school,” and “I am getting a good education at this school.” As part of the SSP, the School Satisfaction scale has undergone extensive psychometric testing to establish its high validity and reliability [39].

Social relationships

Parent–Child Conflict was measured using a modified version of the Conflict Behavior Questionnaire [43],

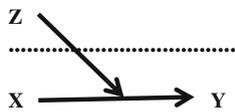
included 10 True and False items, and had a reliability of .82. Examples of the scale items were: “My parent(s) don’t understand me,” “My parent(s) seem to be always complaining about me,” and “I don’t think my parent(s) and I get along very well most of the time.” The Conflict Behavior Questionnaire is a valid and reliable measure of parent–child conflict [48]. The 5-item *Parent Support* scale [39] was measured on a 3-point Likert scale and had a reliability of .89. Scale items asked, “During the past 30 days, how often did the adults in your home... (a) Let you know you were loved?, (b) Make you feel appreciated?, (c) Tell you that you did a good job?” The 8 item *Negative Peer Relationships* scale [39] was measured on a 3-point Likert scale and had a reliability of .78. Examples of scale items included: “I am made fun of by my friends” and “I am picked on by my friends.” The 9 item *Negative Friend Behavior* scale [39] was measured on a 3-point Likert scale and had a reliability of .90. Examples of the scale items were: “I have friends who use drugs,” “I have friends who belong to gangs,” and “I have friends who drink alcoholic beverages.” The 5 item *Friend Support* scale [39] was measured on a 3-point Likert scale and had a reliability of .89. Examples of the scale items were: “I can trust my friends”, “I am able to tell my problems to my friends,” and “I feel close to my friends.” The 5 item *Neighborhood Support* scale [39] and the 8 item *Teacher Support* scale [39] were measured on 4-point Likert scales and had a reliability of .77 and .88, respectively. Examples of *Neighborhood Support* items included: “If I had a problem, there are neighbors who would help me” and “People in my neighborhood really help one another out.” Examples of *Teacher Support* items were: “My teachers care about me” and “My teachers listen to what I have to say.”

School level

Administrative data was used to measure the following macrosystem school aggregated characteristics: *School Size*, *Percent of Students at or Above Grade Level in Reading*, *Percent of Students at or Above Grade Level in Math*, *Teacher Turnover Rate* (the percent of teachers who left the school in a year), *Percent of Teachers with Advanced Degrees*, *School Racial and Ethnic Composition* (percent of White, African American, Hispanic, and American Indian students in a school), *School Poverty* (percent of students who receive free or reduced price lunch), and *Teacher Experience* (percent of teachers with 4–6 years of experience and percent of teachers with 10 or more years of experience). These are all single item variables, not psychosocial scales. Consequently, the concepts of psychometric reliability and validity do not apply to these macrosystem variables.

Multilevel Analysis

A multilevel analysis was completed to explore predictors of mental health and behavioral outcomes at both student- and school-levels and test a series of cross-level interactions. The following diagram depicts a multilevel proposition, representing a research hypothesis about a cross-level interaction [49], where Y is the outcome variable, X is a student level independent variable, and Z is a school-level independent variable:



It was hypothesized that a student-level variable impacts the relationship between a school-level variable and the outcome; that is, other things being equal, the impact of a school-level variable on the outcome varies by the level of student-level variable. Under this conceptualization, the student-level variable serves as a moderator. Following ecological and strain theories, macrosystem influences are thought to be moderated by microsystem dynamics.

All statistically significant interactions were combined in a single model. Any non-significant interactions were subsequently dropped from the final model. In order to control for clustering effects (i.e. students from the same school may share common characteristics), Intraclass Correlation Coefficients (ICC) [50] of the outcome variables were evaluated in their original metric and then after being dichotomized (1.5 was used as cut-off score). The Anxiety and Aggression scales, in their original metric, had ICCs of 0.0087 and .0197, respectively. The dichotomized Anxiety and Aggression scales had ICCs of .0079 and .0279, respectively. These results suggest that, at worst, less than 3 % of the variation in the Anxiety and Aggression scales exists between schools. Therefore, clustering effects were not present, and independent observations of the sample data can be assumed for a multilevel analysis with logistic regression.

Analytic Model

The model is expressed by the following equation:

$$\ln\left(\frac{P}{1-p}\right) = X\beta$$

where P is the probability of $Y = 1$ for the outcome variable, X is the matrix of independent variables that includes the three groups of measures described earlier, and may also include cross-level interactions, and β is the vector of regression coefficients showing effects of the independent variables. Taking the exponent of each element in estimating β [i.e., $\exp(\hat{\beta})$], we obtained the odds ratio for each

independent variable, which is the final statistic presented in the findings section.

Missing Data

To handle missing data, listwise deletion was performed [51]. Consequently, the study was comprised of 3,405 students, 78.8 % of the original sample. A series of bivariate analyses were performed to identify differences on key demographic variables between the sample analyzed and the sample not analyzed. Results show that the sample analyzed was slightly older (i.e., 0.16 years older on average, $p < .001$), had a higher proportion of females (i.e., 9.33 % higher, $p < .001$), a lower proportion of students using free and reduced lunch (i.e., 6.38 % lower, $p < .001$), a lower proportion of African American students (i.e., 9.29 % lower, $p < .001$), a higher proportion of American Indian students (i.e., 8.94 % higher, $p < .001$), and a lower proportion of Mixed or Other race (i.e., 2.76 % lower, $p < .05$) than the sample not analyzed. All of these variables are controlled for in the analyses.

Results

Sample descriptive statistics and model-estimated odds ratios of independent variables are displayed in Table 1.

Predictors of High Anxiety

The model had a reasonable fit to the data, as reflected by the model Chi-square of 721.3 (with 32° of freedom) that is significant at the .0001 level. Overall, there were 1,337 students (39.3 % of the analysis sample) who reported a high anxiety score.

Several demographic characteristics were associated with high reported anxiety. Females were more likely to experience anxiety than males ($p < .001$): other things being equal, the probability of having a high anxiety score for females was 47.2 % higher than that for males. Students receiving free or reduced lunch were more likely to experience anxiety than other students ($p < .01$): other things being equal, the probability of having a high anxiety score for these students was 26.6 % higher than that for students not receiving free or reduced lunch.

School satisfaction was negatively associated with anxiety ($p < .05$): other things being equal, every one-unit increase in school satisfaction decreased the probability of being high on anxiety by 23.3 %. Ethnic identity was positively associated with high anxiety ($p < .01$): other things being equal, every one unit increase in this scale increased the probability of reporting high anxiety by 22 %. Several of the microsystem social relationship variables were

significantly associated with anxiety. Students reporting high parent–child conflict were more likely to report high anxiety ($p < .001$): other things being equal, every one-unit increase in parent–child conflict was associated with a seven-fold increase in the probability of reporting high anxiety. Negative peer relationships were positively associated with high anxiety ($p < .001$): other things being equal, every one unit increase in this scale increased the probability of reporting high anxiety by 308 %. Negative friend behavior was also positively associated with high anxiety ($p < .01$): other things being equal, every one-unit increase in negative friend behavior increased the probability of reporting high anxiety by 39.8 %.

Two cross-level interaction tests were statistically significant. First, student's discrimination experiences accelerated the impact of teacher turnover on experiencing anxiety ($p < .05$); Fig. 1 is a graphic representation of this interaction effect. For students whose discrimination experience was low (i.e., discrimination = 1), an increase in the school's teacher turnover rate decreased students' likelihood of having a high anxiety score; for students whose discrimination experience scale was high (i.e., discrimination = 2 or 3 or 4), an increase in the school's teacher turnover rate increased the likelihood of being high on anxiety, and the likelihood reaches the highest level of 89 % for students whose discrimination scale was 4 and who studied in a school with a teacher turnover rate of 50 %.

Second, ethnic identity buffered the impact of school's percentage of American Indian students on the likelihood of experiencing anxiety ($p < .01$); this significant cross-level interaction is shown by Fig. 1. When students reported low ethnic identity (i.e., Ethnic Identity = 1), an increase in the school's percentage of American Indian students produced the highest impact on anxiety; as reported ethnic identity increased, the effect of the school's percentage of American Indian students on anxiety decreased; for students with the highest level of the ethnic identity scale (i.e., Ethnic Identity = 4), every one-percentage-point increase in school's

percentage of American Indian students produced the smallest effect on anxiety.

Predictors of High Aggression

The aggression model had a reasonable fit to the data, as indicated by the model Chi-square of 1,040.02 (with 33 degrees of freedom) that was statistically significant at the .0001 level. The model's pseudo R-square indicated that approximately 28.2 % of the variation in the outcome variable was explained by covariates included in the model. Overall, there were 788 students (23.14 % of the analysis sample) who reported a high aggression score.

Several predictors were significantly associated with high aggression. Females were more likely to report high levels of aggression ($p < .01$): other things being equal, the probability of having a high aggression score for females was 38.5 % higher than that for males. Students reporting high parent–child conflict were more likely to report high aggression ($p < .001$): other things being equal, every one-unit increase in the parent–child conflict scale increased the probability of reporting high aggression by 1,096 %. In other words, students experiencing higher parent child conflict were ten times more likely to report high aggression than students with less conflict with their parents. Students reporting high negative peer relationships were more likely to report high aggression ($p < .001$): other things being equal, every one-unit increase in the negative peer relationships scale increased the probability of being high on aggression by 142.5 %. School satisfaction decreased the likelihood of reporting high aggression ($p < .001$): other things being equal, every one-unit increase in the school satisfaction scale decreased the probability of reporting high levels of aggression by 57.9 %.

Regarding school aggregated variables, teacher experience was significantly associated with aggression. Schools with more teachers who have advanced degrees tended to have a greater probability of students reporting high

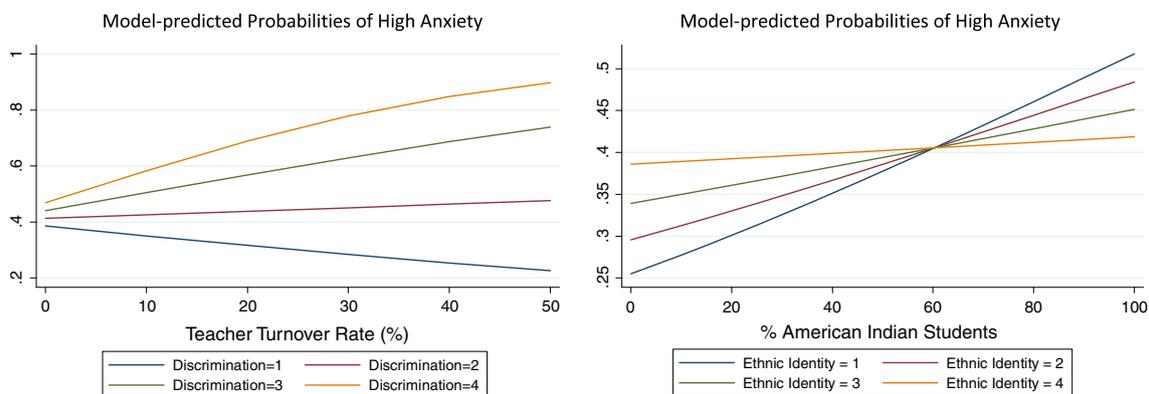


Fig. 1 Cross-level interactive effects on the probability of high anxiety

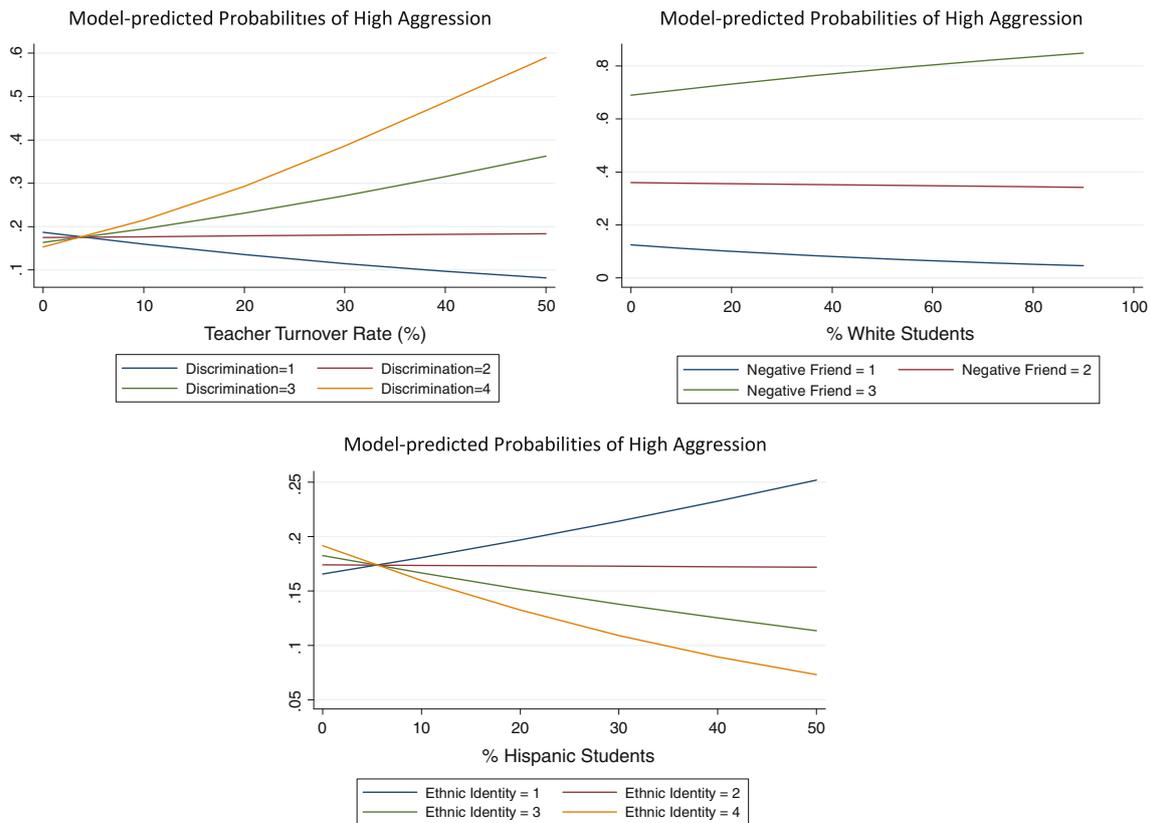


Fig. 2 Cross-level interactive effects on the probability of high aggression

aggression ($p < .01$): other things being equal, every one-percentage-point increase in the percentage of teachers with advanced degrees increased the likelihood of reporting high aggression by 2.7 %.

Of the tested interaction effects, discrimination experiences served as a buffer of the impact of percentage of school’s teacher turnover rate ($p < .05$). Figure 2 illustrates a model-based prediction of joint effects of the two variables: as the figure shows, students who reported a low level of discrimination experience (i.e., Discrimination Experiences = 1) tended to have a decreased probability of reporting high aggression when the school’s teacher turnover rate increased. However, when discrimination experiences increased, every one-percentage-point increase in the teacher turnover rate resulted in a higher likelihood of reporting high aggression; this is clearly the case for students who reported the highest level of discrimination experience (i.e., Discrimination Experiences = 4): when teacher turnover rate approached 50 %, the likelihood of reporting high aggression for this group of students was approximately 60 %.

Finally, ethnic identity buffered the impact of school’s percentage of Hispanic students ($p < .05$). Figure 2 is a model-based prediction of joint effects of the two variables; as the figure shows, when ethnic identity was low

(i.e., Ethnic Identity = 1), an increase in school’s percentage of Hispanic students increased the probability of reporting high aggression. However, when ethnic identity increased, the impact of school’s percentage of Hispanic students on aggression decreased; for students reporting highest ethnic identity (i.e., Ethnic Identity = 4), every one-percentage-point increase in school’s Hispanic student composition decreased the likelihood of being high on Aggression—this likelihood is about 7.5 % for the group of students who attended schools composed of 50 % Hispanic students.

Discussion

This study contributed to extant knowledge on rural youth by identifying individual, social, and school-level predictors of anxiety and aggression in this under-studied population. It is interesting to note that the overall prevalence of high anxiety (39 %) in this sample appears to be significantly higher than estimates for the general population of adolescents (9.9 %) [1], while the overall prevalence for aggression (23 %) mirrors that found in the population for behavior disorders (23 %) [1]. This finding should be interpreted with caution, though, because the current

conceptualizations of anxiety and aggression do not necessarily correspond with diagnostic criteria for anxiety or behavior disorders. However, rural school counselors should take note of this finding and pay particular attention to the potentially high levels of anxiety in this population. Further research is needed to compare the prevalence of anxiety and aggression of low-income, rural youth with that of the general adolescent population.

The demographic risk factors identified through the current study models are partially consistent with existing research. Females appear to be at increased risk for both anxiety and aggression. This is consistent with previous research on anxiety [24], but seems to contradict aggression research which generally identifies males as more aggressive than females [34, 35]. It is likely that this inconsistency is due to the fact that aggression in the current study includes both overt aggression (e.g. I get in many fights) and relational aggression (e.g. I tease others a lot). While researchers generally find that males are more overtly aggressive, females have been found to display higher levels of relational aggression (e.g. [52]). This suggests that rural schools should implement aggression interventions tailored specifically for females. Further, this large-scale survey was administered to groups of students in school computer labs. Within this setting, it is possible that females are more willing to disclose aggressive behavior while males under-report, resulting in a social desirability bias for males.

Based on ecological and strain theories, we hypothesized that sources of social strain would be related to higher youth anxiety and aggressive behavior. There was evidence supporting this hypothesis. Socioeconomically disadvantaged students who received free or reduced price lunch were more likely to report anxiety, which is in line with previous research [27] and with Strain Theory. Disadvantage was not significantly related to aggression. It is possible that the risk factors associated with rural and disadvantaged youth, such as barriers to service utilization, lead to higher rates of anxiety for this vulnerable population. Anxious youth may worry about the socioeconomic stress in their families or the lack of employment opportunities in their rural communities. Self-consciousness is one hallmark of adolescent development. Socioeconomically disadvantaged youth may be anxious about their appearance (e.g., clothes and hygiene) and in meeting social goals as they compare themselves to other youth. School counselors should be aware of the association between poverty and anxiety so that they can help provide disadvantaged youth with coping techniques that are effective in lowering symptoms of anxiety.

Interestingly, ethnic identity was positively related to adolescent anxiety. This is an important indication of the stress associated with youth trying to fit into their cultural

group. Past research has consistently linked ethnic identity to self-esteem in minority children and adults [53–55]. For example, after examining a sample of 669 Latino, African American, and White U.S.-born high-school students, Phinney and her colleagues reported that ethnic identity predicted higher self-esteem in all three ethnic groups [55]. Current analyses extend this research to consider the relationship between ethnic identity and anxiety in rural youth. Ethnic identity may heighten anxiety by making youth particularly sensitive to the racially focused messages in their environments. This finding should not be interpreted as grounds to discount the importance of fostering ethnic identity in minority youth; rather, it should serve as a reminder of the vulnerability of minority youth and the need for additional support around issues of race and ethnicity. Adolescents highly invested in their ethnic identities may perceive more discrimination and lack of support for their ethnic group. They may choose behaviors or norms that are in line with their ethnic heritage, but cause them to stand out from other peer groups. This dynamic could single these adolescents out, thus leading to higher anxiety. High affiliation with one's ethnic identity may bring support and heighten self-esteem when the adolescent is with members of his or her ethnic group, but may heighten anxiety when he or she is not surrounded by like-minded ethnic peers. Ethnic identity was not significantly related to aggressive behavior.

There was strong evidence supporting hypothesis two—proximal microsystem influences, particularly parents and then peers, displayed strong links to adolescent mental health. As indicated in previous research, parent–child conflict is a particularly deleterious risk factor across negative outcomes, especially for minority youth [56–59]. In the current study, parent–child conflict was also the strongest risk factor for anxiety and aggression in rural youth. Shockingly, the chances of adolescents experiencing high anxiety were 8 times greater and the chances of high aggression 12 times greater for every one unit increase in parent–child conflict. Conflicts between parents and adolescents undermine the attachment bonds in their relationship. During conflict, a lack of engagement, affection, guidance, mentoring, and safety from the family system leaves adolescents to deal with environmental stressors and strains without adequate familial support, heightening anxiety. Parental authority and monitoring is also destabilized during conflict, opening opportunities for adolescents to act out their aggressive frustrations and engage in serious risk-taking behavior.

Negative peer relationships and negative friend behavior were significantly associated with anxiety and aggression. Additional research is needed to determine causality, as it is possible that negative peer relationships and behavior may lead to anxiety and aggression, or vice versa. In either

case, peer relationships are an important intervention area for children who are displaying anxious or aggressive behavior. This is a pernicious cluster of problematic behaviors for adolescent development. Anxiety and aggression in youth may lead them to seek out like-minded, risk taking peers. The resulting negative behavior reinforced by negative peers provides escalating feedback loops that are difficult to stop. A potentially positive aspect in this cluster of relationships is the presence of anxiety. Perhaps the relationship between anxiety and aggression suggests that risk-taking youth have some level of self-awareness concerning their behavior that generates anxiety. Anxious self-awareness or concern about worrisome consequences may keep aggression in a controllable range and keep the adolescent from embarking on serious violence.

Our third hypothesis suggested that distal macrosystem influences, such as school characteristics, would have less impact on adolescent mental health, however, these influences would be moderated by salient microsystem factors, forming complex cross-level interactions. There was some evidence to support this assertion. Risk and protective factors related to school were important predictors of anxiety and aggression. Increases in school satisfaction were associated with a 23 % decrease in the probability of anxiety and a 58 % decrease in the probability of aggressive behavior. School satisfaction can be seen as an important indicator of “fit” between the child and the ecological system. When there is a good fit, anxiety and aggression decrease, showing less strain placed on the individual. Consequently, enhancing school satisfaction may be an effective target for prevention of both adolescent anxiety and aggression.

The identification of school aggregated characteristics associated with anxiety and aggression was an important addition to the literature. There is a general lack of research on school-level characteristics and student behavioral and mental health outcomes [60], and there is a particular dearth for rural schools. Increased rates of teacher turnover were related to lower levels of student anxiety and aggression. This may be an indication of optimism in change; students may prefer the idea of having new teachers compared to continuing to be taught by teachers that they do not like. The strain of dealing with teachers a child does not like may be relieved when teacher turnover is high. More research is needed to confirm this dynamic.

It appears counterintuitive that schools with more teachers with advanced degrees were more likely to have students with high aggression. Having a cohort of well-educated teachers may raise the bar in what is expected from students in the school, thus increasing the strain on impoverished adolescents. These high expectations, in turn, may frustrate students who are not ready or able to perform at that level, engendering acting out behavior and

aggression. Similar to this effect for teacher education, students reported more anxiety in schools with more teachers with 4–10 years of experience. These energetic, less experienced teachers may come in with high expectations for their students, creating anxiety. The racial composition of a school may also impact student behavior and mental health. For reasons that are not clear, the percentage of White students in school was related to lower aggression while the percentage of American Indian students was related to higher anxiety. Further research is necessary to explore these relationships and explain these findings.

Supporting our final hypothesis, cross-level interaction effects between macro- and microsystem indicators were particularly interesting, complex, and challenging to interpret. There was a significant interaction between students’ discrimination experiences and the school’s teacher turnover rate. Student anxiety and aggression were highest in settings where students tended to report high discrimination and there were high rates of teacher turnover. The combination of these two variables may indicate toxic school environments where students and teachers feel alienated. This effect also suggests that students who are discriminated against are particularly vulnerable to the negative impact of high teacher turnover, raising their anxiety and aggressive behavior. Students who experience discrimination especially benefit from stable relationships with teachers and these stable relationships are disrupted or lost during high levels of teacher turnover.

A particularly interesting finding is the interaction between ethnic identity and 1) school percentage of American Indian students and anxiety and 2) school percentage of Hispanic students and aggression. Direct effects showed that ethnic identity was positively related to anxiety and was not significantly related to aggression. Adding to this complexity, the racial composition of the school was important in determining the effect of ethnic identity. In general, anxiety increased with higher percentages of American Indian students in a school; however, in schools with a high percentage of American Indian students, anxiety was lowest when students reported strong ethnic identities. This suggests that there was a match between the individual’s ethnic identity and the majority of students surrounding him or her. This match lowered anxiety. Previous research has found that ethnic identity among American Indian adolescents is significantly higher in predominantly American Indian schools compared to predominantly White schools [61]. An American Indian student with low ethnic identity in a predominantly American Indian school may feel isolated because he or she is surrounded by peers who identify strongly with their Native American background, resulting in a higher rate of anxiety. However, this explanation does not hold for Hispanic

students in light of previous research reporting that ethnic identity was higher among Hispanic/Latino students in a predominantly non-Hispanic/Latino school compared to a predominantly Hispanic/Latino school and a balanced Latino/non-Latino school [62]. Our second interaction effect showed that aggression was lowest in schools with higher percentages of Hispanic students who reported strong ethnic identities. This may indicate that students feel most secure in environments where personal identity is reinforced by group identity. While the explanation behind the mediating role of ethnic identity in predominantly Native American and Latino schools is complex, current results indicated that intervention efforts could focus on fostering ethnic identity in these settings.

Limitations

Study surveys were completed at school, so it is possible that the presence of peers or teachers influenced student responses. However, precautions were taken to make the setting as private as possible and to emphasize that responses would be kept confidential.

The generalizability of the current study is limited because the participants in this study were low-income, rural youth; therefore the results can only be cautiously generalized to other populations. Another limitation involves the measurement of anxiety and aggression. “High levels” of anxiety and aggression, as measured in this study, do not necessarily correspond with clinically diagnosable disorders and caution is warranted when comparing results to studies assessing diagnosable disorders. Even so, the Youth Self Report subscales used to assess aggression and anxiety have been completed by tens of thousands of study participants over several decades of research. Despite cautions concerning external validity, the results of this study have important implications for basic and applied research on risk and protective factors in rural youth.

Summary

The current study identified important predictors of anxiety and aggression in a large sample of rural, low-income youth. The prevalence of both anxiety (39 %) and aggression (23 %) in this sample was troubling, indicating a need for increased mental health services and prevention programming in rural areas. The results identify target areas for prevention and intervention efforts in individual, peer, family and school domains. Specifically, parent–child conflict, negative peer relationships, and negative friend behaviors should serve as targets for prevention programs. Overall, this study contributes to current knowledge on risk

factors of rural youth and supplements research on anxiety and aggression in youth in general.

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