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**The Relationship of Student Demographics to
10th Grade MCAS Test Anxiety**

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Assessing student knowledge has been an enduring dilemma. Testing is now a ubiquitous aspect of our current culture across multiple disciplines (Cizek & Burg, 2006). Test results are used to make critical decisions about placement levels in schools, in colleges, and to determine occupational competencies (Zeidner, 1998).

In the most sweeping federal reform, the No Child Left Behind Act (NCLB) was enacted in 2002 and instructed schools to meet minimum standards by making regular progress toward proficiency as measured by mandated standardized tests creating a massive proliferation of testing in American public schools (Hauser, Frederick, & Andrew, 2007). While NCLB sanctions were aimed at school districts, many states responded by holding students accountable for their own academic success or failure to meet performance targets (Gamoran, 2007). The Commonwealth of Massachusetts responded to the Education Reform Law of 1993 by adopting the Massachusetts Comprehensive Assessment System (MCAS) in order to meet the requirements of this law (Massachusetts Department of Education, 2007). The MCAS testing program assesses all students including special needs students and LEP (limited English proficient) students enrolled in public schools. One of the functions of the MCAS testing program is to establish students' qualification for the Competency Determination requirement in order to be awarded a high school diploma (Massachusetts Department of Education, 2007).

As the amount and the importance of tests used in education has increased, the number of students who experience test anxiety has also increased

(Casbarro, 2005). Earlier studies had reported the number of students who experienced test anxiety in rates of 10% to 25% (Hill, 1984; Kondas, 1967). More recent research has indicated that more than 33% of U. S. elementary and secondary students experience some test anxiety (Methia, 2004).

Since an annual administration of standardized testing is being used by several states in this country as a performance indicator for improved student achievement, the aspect of test anxiety upon students' performance should be considered. The results of a North Carolina teacher survey in 1998 indicated that 61.2 % of the participating teachers agreed that student stress levels were more evident (Jones, Jones, Hardin, Chapman, Yarbrough, & Davis, 1999). These teachers attributed their students' stress levels to high-stakes testing. High levels of anxiety have been shown to have harmful influences upon students' achievement including lowered academic performance, poorer study skills, and greater academic avoidance behaviors (Everson, Tobias, Hartman, & Gourgey 1993; Keith, Hodapp, Schermelleh-Engel, & Moosbrugger, 2003; Neveh-Benjamin, McKeachie, & Lin, 1987; Zeidner, 1995).

High-stakes testing situations have the potential to create increased test anxiety and to reduce a participant's performance on standardized achievement tests (Casbarro, 2005; Cizek & Burg, 2006; Everson, Millsap, & Rodriguez, 1991). In the area of psychometrics, the interpretation of test scores is derived from the validity of inferences about students' academic knowledge or skills from their test performance (Cizek & Burg, 2006). When test anxiety reduces students' test scores, it becomes a factor that could threaten the relevance of any

conclusions drawn between test scores and student achievement or student progress.

While research has examined test anxiety across college and adult populations in high-stakes assessment contexts, there is less evidence regarding the effects of specific high-stakes testing and its perceived influence upon high school students (Kohn, 2000). The purpose of this study was to explore the possible correlation between high school student demographics and these students' levels of test anxiety regarding their successful completion of MCAS testing as a graduation requirement. As public schools continue to examine methods to eliminate the achievement gap between socially advantaged and disadvantaged students as measured by improvement in their students' standardized test scores, educators may also need to consider test anxiety and its influence upon different student populations.

BACKGROUND OF THE STUDY

Our competitive society is beginning to cause an increase of stress in daily living for both adults and children (Casbarro, 2005). The general concept of anxiety is defined as an internal feeling of unrealistic or excessive alarm or tension that a person experiences despite the fact that no real, palpable threat to the person exists (Casbarro, 2005; Cizek & Burg, 2006).

Nature of Test Anxiety

Test anxiety is separated from the general anxiety construct by stipulating the event or context in which it occurs (Putwain, 2008). Currently, test anxiety is considered a blend of physical, social, and cognitive responses characterized by

distress and uneasiness associated with test taking (Cizek & Burg, 2006; Dykeman, 1994). This anxiety is linked to concerns over failure or other possible negative consequences due to a poor performance. One can temporarily lose processing and comprehension abilities while participating in a test situation. Test-anxious children and adolescents “do not approach a task such as a test with a positive outlook or expectation of success, but with dread regarding the potential for negative evaluation or failure” (Cizek & Burg, 2006, p. 17).

Current Constructs of Test Anxiety

Researchers have analyzed the complex, multi-dimensional aspects of the test anxiety construct in order to explain the relationship between the physical, social, and cognitive aspects of test anxiety (Cizek & Burg, 2006). These aspects play an important role in the perceived threat of an upcoming test. When an individual encounters a test with significant levels of test anxiety, an individual's behaviors, cognitions, and physiology are altered.

Currently, the important debilitating dimensions that conceptualize the test anxiety construct are considered to be the following: emotionality or physiological hyperarousal (i.e., shallow or rapid breathing, sweaty palms, elevated heart rate, general sweating, feelings of nausea, or a stress headache); worry (i.e., cognitive concerns about performance and negative, self-deprecatory thoughts); cognitive interference (i.e., the degree to which test anxiety interferes with an individual's concentration, their recall abilities, or their effective problem-solving skills before or during a test); a lack of self-confidence and/or a lack of self efficacy to face academic challenges; and social humiliation/worries of being belittled by

significant others for failure in a testing situation (Friedman & Bendas-Jacob, 1997; Hodapp, 1995; Hodapp & Benson, 1997; Liebert & Morris, 1967; Spielberger & Vagg, 1995). Several researchers have stressed that the worry component, rather than the emotionality or physiological hyperarousal component, has been found to be a stronger factor in test anxiety, and the component linked to lower test performance (Everson et al., 1991; Hembree, 1988; Liebert & Morris, 1967; Stober & Pekrun, 2004).

Variables Related to Test Anxiety

There are several factors that relate closely to test anxiety (Cizek & Burg, 2006). Variables of key influence include gender, socioeconomic status, and teacher-manifested anxiety (Hembree, 1988). Educational researchers have reported that test anxiety is more prevalent in females than in males regardless of grade level. (Cizek & Burg, 2006; Hembree, 1988; Locker & Cropley, 2004). Guida and Ludlow (1989) found that low socioeconomic students appear to suffer from higher levels of test anxiety than more advantaged students. Finally, another cause of student test anxiety can be teacher anxiety (Cizek & Burg, 2006). In his summative research, Hembree (1988) reported a strong correlation ($r = .64$) between teacher anxiety and student test anxiety. Teachers as well as students are participants in high-stakes testing situations. Griffin-Jeansonne and Caliste (1984) reported a link between teachers' awareness of their feelings (concerns/anxieties) and those concerns being transferred and perceived by their students.

Other Influences Upon Test Anxiety

Test anxiety also appears to be related to a student's poorer study skills and to the type of family relationships and level of support at students' homes (Cizek & Burg, 2006). Studies have shown that effective study habits and test-taking skills among high school students are associated with lower test anxiety (Casbarro, 2005; Hembree, 1988). In relation to home environments, families whose parenting styles reflect positive and supportive responsiveness have an inverse effect upon their children's potential to be susceptible to test anxiety (Guttman, 1987; Peleg-Popko & Klingman, 2002; Sapp, 1999). The opposite effect can occur when parents place excessively high academic demands on their children starting at the early elementary level, and their children's school performance does not match these unrealistic expectations (Hill & Wigfield, 1984). Such demands are considered to be one of the primary causes of test anxiety (McDonald, 2001).

METHODOLOGY

The research design of this study was a two-phase, sequential, mixed-methods, multiple regression study. A multiple regression design was used to identify the extent to which four independent variables (student socioeconomic status, student gender, student perceived teacher anxiety, and student preparedness) accorded variance to predict students' levels of test anxiety as they confronted a high-stakes testing situation. The quantitative portion of the study involved the administration of the *Test Anxiety Inventory* (TAI) to ($n=80$) low socioeconomic high school students and ($n=76$) high socioeconomic high

school students to examine how levels of MCAS test anxiety related to various students' personal demographics. The TAI contained a Worry Subscale and an Emotionality Subscale. The Worry Subscale was comprised of 8 items that assessed students' cognitive concerns about the consequences of performance failure. Sample items are as follows: *Thoughts of doing poorly interfere with my concentration on tests/During examinations I get so nervous that I forget facts I really know*. The Emotionality Subscale also had 8 items that assessed students' physiological reactions to stress. Sample items are as follows: *While taking examinations I have an uneasy, upset feeling/I feel my heart beating very fast during important tests*. The items were rated using a 4-point scale ranging from "almost never" to "almost always". Prior research results regarding the TAI indicated that the survey and its subscales provided valid measures and reliable data for test anxiety as a situation-specific personality trait (Spielberger, 1980).

A questionnaire was developed containing a student information cover sheet that was attached to a copy of the TAI. Students' observations of teacher anxiety were assessed on the questionnaire using a 5-point rating scale ranging from "never" to "always". Student preparedness was assessed by asking students to approximate the number of hours per week they had spent preparing for the 10th grade MCAS exam during the past month.

Color-coded parental consent forms were used to identify and separate students into socioeconomic groupings. Qualitative interviews were conducted and provided a thick description of influences between the variables (Creswell, 2003; Gall, Gall, & Borg, 2007).

Research Questions

This study examined the relationship between test anxiety levels and student demographics regarding a high-stakes exit examination as a high school graduation requirement. The main research question was as follows:

To what extent and in what manner can variation in 10th grade MCAS test anxiety be explained by student socioeconomic status, student gender, student perceived teacher anxiety, and student preparedness?

Sub questions included:

- a) What are the perceptions of high school students regarding how their anxiety levels influence their performance during high-stakes testing?
- b) What practices do school administrators and teachers perceive to be helpful in reducing students' anxiety regarding high-stakes testing?

Sample

High school students with low socioeconomic status ($n=80$) and high school students with high socioeconomic status ($n=76$) were selected through purposeful sampling (i.e., students who were taking the 10th grade MCAS exam for the first time). Socioeconomic status was determined by qualification for a free or reduced-price lunch. Students were classified in a “free or reduced-price lunch” group and a “non-free or reduced-price lunch” group. A list of students who qualified for a free or price-reduced lunch was maintained by the high school’s administrative office.

Three high schools were selected as representative of the high school population taking the 10th grade MCAS exam. The demographics of these schools were as follows: a suburban high school with a population of ($N=1,290$) students, an urban-ring high school with a population of ($N=1,505$) students, and an urban high school with a population of ($N=1,739$) students.

Personal interviews were conducted with ($n=20$) high school students, ($n=10$) secondary teachers, and ($n=2$) secondary school administrators. The sub-sample included volunteer ($n=10$) students, ($n=5$) teachers, and ($n=1$) administrator from the urban school district and volunteer ($n=10$) students, ($n=5$) teachers, and ($n=1$) administrator from the suburban school district.

Data Analysis

Results gathered from the quantitative survey instrument, the TAI, were analyzed in order to address the major research question. The Statistical Package for the Social Sciences software (SPSS, 2007) was used to analyze the survey data. A multiple regression design was appropriate for this study because it enabled an analysis of the degree to which each independent variable (i.e., students' socioeconomic status, student gender, student perceived teacher anxiety, student preparedness) contributed to predictions of levels of the dependent variable or test anxiety (Huck, 2008; Phillips, 2002). Evidence of a correlation between the criterion variable and a combination of the predictor variables helped inform research results and recommendations.

In-depth qualitative interviews provided opportunities for individuals being studied to explain their experiences and the reasons for their survey responses.

An interview guide was developed to ensure dependability and credibility of the data (Gall et al., 2007; Rubin & Rubin, 2005). Three separate interview guides were created for volunteer student participants, volunteer teacher participants, and volunteer administrator participants. Personal interviews encouraged students to describe themselves as learners, to rate their level of test anxiety, to explain their coping responses when facing a high-stakes testing situation, and to discuss any environmental influences on their levels of test anxiety. Personal interviews with school leaders and teachers examined their attitudes regarding their schools' accountability, the levels of pressure placed upon staff, their ratings of their students' anxiety levels, and their attempts to decrease their students' levels of test anxiety regarding the completion of MCAS testing.

Validity

External validity of the research study was restricted by the selection of 9th and 10th grade high school students as sample members. The researcher conducted all of the interviews to control for interviewer error (Creswell, 2003; Gall et al., 2007).

The topics of the research study and related instrumentation could be threats to the internal validity of the research design. Informing participants of the intent of the research and the value of their input, as well as providing the use of incentives, could control for untruthful responses. The researcher made efforts to ensure that the interview questions were relevant to both student and educator participants, and that the length of time for survey completion and interview participation was reasonable (Gall et al., 2007).

RESULTS

A multiple regression analysis was used to examine the relationship between high school student test anxiety levels and four predictor or independent variables: student gender, student ratings of perceived teacher anxiety, student preparedness, and student socioeconomic status.

Data Analysis for Quantitative Findings

Table 1 contains the results of the multiple regression analysis for the variable of the TAI Worry Subscale T-Score.

Table 1
Stepwise Regression Analysis for TAI Worry Subscale T-Score

Variable	<i>R</i>	<i>R</i> ²	Beta	<i>t</i>	<i>p</i>
Socioeconomic Status	-.22	.05	-.21	-2.68	.008
Ratings of Teacher Anxiety	.28	.08	.17	2.15	.033

As can be seen in Table 1, the variable of student socioeconomic status was entered in the multiple regression equation first, since it had the highest inverse correlation ($r = -.22$) with the dependent variable of the TAI Worry Subscale T-score, and it explained 5% of the variance in the Worry Subscale T-score.

Consequently, higher socioeconomic status (“non-free/price-reduced lunch group”) was related to a decrease in the amount that students worried about a poor MCAS test performance. The second variable entered in the regression equation was student ratings of teacher anxiety resulting in a multiple correlation of ($R = .28$) and explained 8% of the variance of the Worry Subscale T-score. Therefore, as ratings of teacher anxiety increased, the TAI Worry Subscale T-

score also increased. No other variables were selected for entry into the equation as they did not significantly add to the explanation.

Table 2 contains the results of the multiple regression analysis for the variable of the TAI Total T-Score.

Table 2
Stepwise Regression Analysis for TAI Total T-Score

Variable	<i>R</i>	<i>R</i> ²	Beta	<i>t</i>	<i>p</i>
Socioeconomic Status	-.17	.03	-.17	-2.15	.033

The variable of student socioeconomic status was entered in the multiple regression equation first, since it had the highest inverse correlation ($r = -.17$) with the dependent variable of the TAI Total T-score, and it explained 3% of the variance of the TAI Total T-score. Therefore, higher socioeconomic status (“non-free/price reduced lunch group”) yielded a decrease in the TAI Total T-score. No other variables were selected for entry into the equation as they did not significantly add to the explanation.

Overall, the quantitative findings of this research study indicated that the variables of student socioeconomic status and student ratings of teacher anxiety accounted for the variance in the TAI Worry Subscale T-Score. The variable of student socioeconomic status was inversely related to students’ level of test anxiety. More students with low socioeconomic status (“free/reduced-price lunch group”) yielded higher overall scores for the worry components of the TAI than students with high socioeconomic status (“non-free/price-reduced lunch group”). Also, the variable of student ratings of teacher anxiety was positively correlated

with students' levels of test anxiety. Greater teacher anxiety ratings were related to greater student test anxiety.

Data Analysis for Qualitative Findings

Individual interviews were conducted with students ($n=20$) and educators ($n=12$). From the audiotapes of these interviews, a verbatim text was transcribed for each participant. The transcripts from the qualitative interviews were processed for data reduction by identifying common data categories from changing topics in the interviews (Pollio, Henley, & Thompson, 1997). These meaning units were then analyzed into an overall pattern of themes with supporting textual evidence.

The qualitative interviews with high school students and secondary educators yielded varied results. Students indicated that they did believe that their level of test anxiety would influence their performance on MCAS testing with low-test anxious students predicting a strong performance and high-test anxious students predicting a poor performance. Students reported that the type of comments made by their teachers and parents about MCAS, the uncertainty of the MCAS test content, and fears of social humiliation could increase their feelings of test anxiety. Low-test anxious student indicated that higher levels of academic self-efficacy and cognitive focus were behaviors that decreased feelings of test anxiety. Students' lists of coping responses included test study/preparation, some social support, and denial/trivialization of the importance of the MCAS test. None of the test-anxious students interviewed mentioned seeking support from the school counseling staff.

The educators reported that they helped reduce their students' test anxiety through verbal encouragement and by improving the academic self-efficacy of their students. Only one teacher reported referring test-anxious students for counseling services. The majority of educators indicated that they felt that overall student test anxiety had remained at the same level over the past few years. Many of the teachers were able to identify test-anxious behaviors in their students such as hyperactivity, excessive attention to test preparation, belligerent posturing/anger, and withdrawal. They cited the expansion of subject areas tested on MCAS, uncertainty of the MCAS test content, retesting experiences if students fail, and student propensity for anxiety as reasons for the presentation of test-anxious behaviors. Finally, the majority of the educators indicated that they did not experience direct district or school pressures to improve their students' MCAS test performance. Rather, these educators placed internal pressure upon themselves to improve student test performance and student achievement.

PRINCIPAL FINDINGS

Predictor Variables of Test Anxiety

Student Socioeconomic Status. Results of the quantitative multiple regression analysis yielded the finding that the variable of student socioeconomic status was inversely related to students' level of test anxiety. More students with low socioeconomic status ("free/price-reduced lunch group") yielded higher overall scores for both the worry components and the emotionality components of the *Test Anxiety Inventory* (TAI) than students with high socioeconomic status

("non-free/price-reduced lunch group"). This result is consistent with the findings of other researchers (Cizek & Burg, 2006; Guida & Ludlow, 1989; Hembree, 1988).

From the qualitative analysis of student interview transcripts, a difference emerged regarding students' view of failure and success in school when compared as a function of socioeconomic status. When describing their MCAS performance fears, none of the high socioeconomic students ("non-free/price reduced lunch group") used the word "fail." Instead, they talked about "not passing" the MCAS exam. In contrast, the majority of the low socioeconomic students ("free/price-reduced lunch group") consistently used the word "fail" when talking about an unsuccessful performance on MCAS. They appeared to be more accepting of the concept of failure in relation to school activities. Several students with high socioeconomic status ("non-free/price-reduced lunch group") voiced their belief that success was a result of planning, setting goals, and hard work as follows:

It would embarrass me a lot if I didn't pass the MCAS. I wasn't brought up that way. I work hard for everything, and my work usually pays off. That's the way my parents are, and that's the way I am.

A dissimilarity of tone was evident in the beliefs of some students with low socioeconomic status ("free/price-reduced lunch group"). They did not believe that their academic efforts would produce a desired, successful result (Bandura, 1997). They viewed life events as sometimes unfair or unpredictable. They felt that success was due more to luck and out of their control as follows:

Some kids are lucky. Things seem to come easier for them, not me.

Students who feel overwhelmed and powerless as they face environmental challenges are reported to exhibit increased anxiety levels (Casbarro, 2005).

Student Ratings of Teacher Anxiety. Another quantitative finding indicated that along with the variable of student socioeconomic status, the variable of student ratings of teacher anxiety accounted for the variance in the TAI Worry Subscale T-Score. Greater teacher anxiety ratings were positively correlated with greater student test anxiety. This result was consistent with the findings of Hembree (1988). When rating their teachers' anxiety over MCAS, students talked about interpreting their teachers' indirect behaviors as indications of concern. Students' higher ratings of teacher anxiety were linked to how often teachers talked about the importance of MCAS, the frequency of time specifically set aside to review for MCAS, and the rapidity of coverage of complex learning materials. Connor (2003) reported similar research findings and stated that teachers' frequent comments about an upcoming testing event appeared to increase students' focus upon their performance and their fears of failure. During the individual interviews, the majority of students and educators stated that they did not experience any direct pressure from their schools regarding MCAS test performance or other academic accomplishments.

Influences of Anxiety Levels on Test Performance

During qualitative interviews, the majority of students indicated that they believed that their level of test anxiety would influence their MCAS test performance. Low-test anxious students repeatedly voiced their confidence and assurance that they would pass the 10th grade MCAS test. They reported that

they would have no difficulty remaining focused primarily on the demands of the test. In contrast, high-test anxious students reported they would not be able to perform up to their potential during the upcoming 10th grade MCAS. This finding is consistent with the reports of other educational researchers (Casbarro, 2005; Everson et al., 1991). The cognitive interference dimension of test anxiety can decrease one's concentration and focus skills, weaken the ability to remember and/or retrieve learned information as well as block effective problem-solving skills (Friedman & Bendas-Jacob, 1997; Swanson & Howell, 1996; Wine, 1971). High-stakes testing situations have the potential to reduce a high-test anxious participant's performance on standardized achievement tests.

Strategies for Test Anxiety Reduction

Increased Academic Self-Efficacy. Both low-test anxious students and educators agreed that any test preparation and/or practice that increased students' academic self-efficacy and general self-confidence was an effective means to reduce anxiety (Bandura, 1997). However, Hancock, (2001) indicated that high levels of test anxiety could alter an individual's behavior. Casbarro (2005) expanded upon these findings and proposed that test preparation efforts would become ineffective if student test anxiety was too elevated. Therefore, high-test anxious students would require emotional preparation as well as academic preparation when confronting high-stakes testing.

Positive Messages to Students. When interviewed, educators reported using verbal encouragement with their students during pre-test preparation efforts. However, many of their students indicated that they did not construe the

messages as positive and supportive nor full of anxiety-reducing language. Students further reported that some of these messages actually increased their anxiety and decreased their motivation to study for the MCAS exam (e.g., talking about the importance of passing the 10th grade MCAS, frequent reference to studying for the MCAS, frequent reference to what might be on the MCAS). There appeared to be a significant disparity between the intent of the messages sent by teachers and student interpretations of the same messages.

Counseling Services. While some teachers were able to describe student test anxiety symptoms, only two educators mentioned contacting or referring students to a school-based mental health professional as a means to facilitate test anxiety reduction. None of the high-test anxious students interviewed indicated that they had contacted their school adjustment counselors or discussed this possibility with their teachers or parents. A possible explanation of this failure to seek supportive services might be an unwillingness of students to report their levels of test anxiety. It was noted during the interview process that a few of the male student participants admitted to only experiencing a low level or a medium level of test anxiety. However, a comparison of the results of their surveys to their verbal comments revealed much higher levels of test anxiety. This disparity between survey and interview results might reflect a reluctance to admit to a trait perceived as a weakness or lack of endurance when facing an environmental challenge. Also, other students might be embarrassed to openly admit to their level of anxiety, and instead, try to cope silently with this issue.

IMPLICATIONS FOR SCHOOLS

In the present study, high-test anxious students reported their expectation to perform poorly on the upcoming 10th grade MCAS. Educational researchers have indicated that without intervention, the negative effects of high-test anxiety will increase in severity over time (Spielberger, Anton, & Bedell, 1976; Swanson & Howell, 1996). High-test anxious students would need to reduce their excessive levels of test anxiety or it could interfere with their test performance (Casbarro, 2005). While Massachusetts schools and educational staff have exhibited significant effort as they prepare their students for MCAS testing, school staff should expand their awareness that different student populations vary in their readiness skills to successfully participate in consequential testing situations. Extensive test review and preparation did not alter high-test anxious students' perception of their expected MCAS test performance. Test anxiety awareness and reduction strategies should be incorporated into high-stakes testing preparation efforts through the following recommendations:

1. Educational staff should receive training to identify symptoms of test anxiety in their students, to identify high-risk student populations, and to carry out strategies to reduce test anxiety symptoms. School-wide protocols should be created with steps of response for different levels of identified test anxiety.
2. Parent organizations should offer topic workshops/seminars to increase parental awareness regarding the impact of their parenting style and their

expectations on their children's academic performance as well as how to use anxiety-reducing language and behaviors at home.

3. Schools should implement methods to raise student self-awareness to recognize their own symptoms of test anxiety and to follow school procedures to address these anxieties.
4. Schools should establish an MCAS processing center with routine hours where students could drop in and/or make appointments for emotional support, question clarification, and tutoring services.
5. Schools should offer a system where less assertive students could confidentially sign up for counseling services to alleviate their test anxiety.

Research investigation into test anxiety has documented that students are reacting to the pressures of consequential testing, and that some of these students are more affected than others (Jones, Jones, & Hargrove, 2003). The stakeholders in public school achievement want all students to be successful test-takers with the highest performance expectations. There are many features that students believe contribute to their successes or failures in school such as effort, ability, and luck (Casbarro, 2005). Teachers and parents often focus on effort and preparation as the main reasons for the success or failure of children when facing academic challenges. In order to prepare all students to be effective test-takers, both academic and emotional test-taking preparation needs to be introduced and reviewed with students.

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