

TESTING A MODEL OF CHANGE IN ACHIEVEMENT MENTORING
FOR SCHOOL BEHAVIOR PROBLEMS

By

ANDREA LYNNE TAYLOR

A Dissertation submitted to the
Graduate School-New Brunswick
Rutgers, The State University of New Jersey
in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Graduate Program in Psychology

written under the direction of

Brenna H. Bry, Ph.D.

and approved by

New Brunswick, New Jersey

October 2010

ABSTRACT OF THE DISSERTATION

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Dissertation Director:

Brenna H. Bry, Ph.D.

Two previous randomly controlled trials of a 5-month, school-based mentoring intervention plus booster sessions delivered by school personnel support the efficacy of this program in reducing declines in school behavior outcomes related to academic achievement, such as discipline referrals and grades, in at risk, urban, minority youth. However, the mechanisms responsible for this effect are unknown. One hypothesis is that the intervention effects changes in cognitions related to school engagement, particularly those related to the degree to which a student perceives the school environment to meet fundamental needs for autonomy, competence, and relatedness. Changes in these cognitions, in turn, could result in school behavior changes. The current research, which joined samples from the previous two trials with a third trial in order to increase power, evaluated the impact of this school-based intervention on cognitive and behavioral outcomes, and the role of cognitions as mediators of the intervention's effect on behaviors. Ninth grade ethnic minority students ($N = 124$) identified as academically at risk by school personnel participated in three randomized controlled trials of the Achievement Mentoring Program in two secondary schools in urban, low income areas in the mid-Atlantic region of the U.S. Program effects and mediation were examined using regression analysis. Results of these analyses indicated

the mentoring intervention significantly reduced student discipline referrals at follow up and this effect was moderated by previous number of discipline referrals. No statistically significant effect on cognitive outcomes was identified and no evidence of mediation by cognitive measures was found for the sample. These results provide support for the mentoring program as an effective intervention on school behavior in at risk, urban, minority youth. Implications of the findings in regard to mechanisms of change are discussed.

Acknowledgements

I would like to thank everyone who provided me with support, encouragement, and guidance throughout the course of this endeavor. I am grateful for the opportunity to pursue this project, and sincerely appreciate all the time and expertise Dr. Brenna Bry provided.

I am so thankful for the love and inspiration provided by my family and dear friends. They are the epitome of a support network; right down to my young nephews, who made their own “computers” from cardboard and worked on their “dissertations” from their car seats during weekend rides home. My sincerest and most heartfelt thanks go out to you all.

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Introduction

In the U.S., almost 1 in 10 people age 16-24 are neither enrolled in high school nor possess a high school credential (U.S. Department of Education, 2007), and the socioeconomic prospects for this group are dimmed on many fronts. The risk and burden of dropout is not borne equally across society. School completion rates are disproportionately low for students of Hispanic, African American, and Native American ethnicity, for students from low-income backgrounds, and for students who attend large urban schools (Christenson & Thurlow, 2004).

There is considerable evidence that mentoring, defined as a caring and supportive relationship between a youth and a non-parental adult, can have positive effects on youth (DuBois, Holloway, Valentine, & Cooper, 2002; Lehr, Hansen, Sinclair, & Christenson, 2003; Rhodes & DuBois, 2008; Wentzel & Wigfield, 2007). A meta-analysis of 55 mentoring program evaluations found benefits of participation in such areas as psychological well-being, involvement in problem behavior and academic outcomes (DuBois et al., 2002; Rhodes & DuBois, 2008).

School-based mentoring (SBM), in which an adult meets with a youth during school, is the fastest growing form of mentoring in the U.S. (DuBois & Karcher, 2005; Karcher, 2008). SBM interventions have been associated with positive effects on school engagement (Anderson, Christenson, Sinclair, & Lehr, 2004; Bry, 2001; Clarke, 2009; Holt, Bry, & Johnson, 2008; Karcher, 2008), defined as the extent to which a student is involved and invested in school and learning (Appleton, Christenson, & Furlong, 2008; Caraway, Tucker, Reinke, & Hall, 2003; Fredricks, Blumenfeld, & Paris, 2004; Holt et al., 2008). Engagement is typically assessed via behavioral indicators such as attendance,

school conduct, and academic performance (Skinner, Kindermann, & Furrer, 2008; Tucker et al., 2002). School engagement features prominently in preventing school dropout, a psychological and socioeconomic issue of great importance (Balfanz, Herzog, & Mac Iver, 2007; Christenson & Thurlow, 2004; Fredricks et al., 2004; Lehr et al., 2003).

What is not well understood is how SBM interventions influence engagement, i.e., what mediates the effects of mentoring on school engagement. Identifying mechanisms through which mentoring interventions enhance school engagement takes on great importance, given the role of school engagement in important social issues, such as school dropout, and the proliferation of mentoring programs.

Connell's Self System Processes theory (Connell, 1990; Connell, Halpern-Felsher, Clifford, Crichlow, & Usinger, 1995; Klem & Connell, 2004) provides a potential model of how interventions may influence school engagement. According to this model, a student's level of school engagement is largely determined by the degree to which a student perceives the school environment to meet the student's fundamental needs for autonomy, competence, and relatedness. Competence involves beliefs about capacity and control. Individuals perceive themselves as competent when they believe they can determine their success, and do what it takes to succeed. Autonomy is the perceived ability to express one's genuine preferences and act in congruence with one's true self. The need for autonomy can be described as the need to do things for personal reasons, rather than as the result of control by others. Relatedness is defined as an individual's sense of being accepted, valued, included, and encouraged by others (Connell, 1990;

Connell et al., 1995; Fredricks et al., 2004; Skinner & Belmont, 1993; Skinner, Wellborn, & Connell, 1990).

The student's perception of how well these needs will be met through engaging in school can be modified by changes in the school environment, such as the introduction of an SBM intervention. According to the model, changes in these perceptions would then lead to changes in school engagement, which should then manifest in indicators such as attendance, conduct, and grades. Thus changes in the environment, such as SBM, could lead to changes in cognitive factors, which in turn may yield changes in behavioral outcomes (school engagement).

The purpose of the proposed study is to examine potential cognitive mediators of the effects of a school-based mentoring intervention (Achievement Mentoring) on behavioral indicators of school engagement in a group of urban, low income, minority group member high school students. Students participated in three separate, randomized, controlled trials of a 5-month mentoring intervention, plus booster sessions, conducted at two large, urban high schools in the mid-Atlantic region of the U.S. In each randomized trial, data were collected at three time points during the course of two academic years, allowing for an analysis of mediation and causal inference.

Cognitive Variables and School Engagement Outcomes

Many studies in the literature provide evidence of a relationship between self-variables associated with relatedness, competence, and autonomy and school engagement. Indeed, according to Caraway et al. (2003), "self variables most directly influence students' level of engagement" (p. 418). In their study of 123 high school

students (50% female, 65% white, 57% freshmen), they found that students' self-efficacy was significantly correlated with both grade point average and attendance.

Evidence from another study (Tucker et al., 2002) provides some support for the roles of perceived relatedness, competence, and autonomy in school as mediators of the relationship between school context and school engagement. Utilizing a sample of 117 African American students from predominantly low income families (61% female, average age 12.3 years), students completed ratings of teacher context (including ratings of structure, involvement, and autonomy support), perceived relatedness in school, perceived competence in school, perceived autonomy in school, and academic engagement. Results indicated teacher structure was a significant predictor of perceived competence, while teacher autonomy support was a significant predictor of perceived autonomy. In turn, perceived autonomy directly predicted academic engagement.

Perceived Relatedness in School and School Engagement

Numerous studies have found perceived relatedness in school to be predictive of academic outcomes (Brewster & Bowen, 2004; Goodenow, 1993; Klem & Connell, 2004; Urga, 2003). Some assess belongingness or bonding with the school as a whole, some assess perceived acceptance by classmates, and some measures assess perception of teacher support. The Psychological Sense of School Membership scale (PSSM) (cite) was designed specifically to assess adolescent students' perceived belonging in the school environment as a whole and its relationship to educational outcomes. Goodenow (1993) examined the relationship between PSSM scores and grades in a sample of 611 students (312 boys, mean age 11.6 years) in grades 5-8 attending a predominantly white, suburban, middle school in the Northeast region of the U.S. The PSSM was administered

in October and grades from official report cards were collected for first quarter and full year final grade reports. PSSM was a significant predictor of grade point average in academic courses both for the first quarter and for the year, accounting for as much as 13% of the variance in grades. Urga (2003) also found sense of school belonging, as measured by PSSM score, to be correlated significantly with self reported grades in a sample of 211 7th and 8th grade students attending a racially diverse, exurban, public middle school in the mid-Atlantic U.S. (112 males, mean age 13.2 years, 49.8% Black, 32.7% White, 9% Hispanic, 8% Asian). This cross sectional study (Urga, 2003) was also the first to examine the relationship between scores on the classmate acceptance scale and academic achievement, finding a significant positive correlation between classmate acceptance and self reported grades. The study author notes a need for longitudinal or experimental studies, such as the one proposed here, in order to better investigate any causal relationships among classmate acceptance and/or school belonging and academic achievement.

As a cognitive variable, perception of teacher support, defined as the degree to which a student feels that teachers listen to, encourage and respect them (Brewster & Bowen, 2004), has been found to significantly impact academic engagement outcomes in several studies. Klem and Connell (2004) examined data from a sample of 3097 elementary and middle school students (ages 7 to 15, 77% Hispanic or African American, 73% eligible for free or reduced price lunch) and found that higher student ratings of perceived teacher support increased the probability of better attendance and test scores. Another study of 633 Latino middle and high school students at risk for school failure (Brewster & Bowen, 2004) indicated that student perceptions of teacher support were a

significant predictor of student reported problem behavior, such that as teacher support increased, mean levels of problem behaviors such as suspensions, fighting, and unexcused absences and tardiness, decreased.

Perceived Competence in School and School Engagement

Several studies suggest perceived competence in school also predicts academic outcomes (Carroll et al., 2008; Zimmerman, Bandura, & Martinez-Pons, 1992). Zimmerman et al. (1992) examined the relationship between two measures of self efficacy -- self efficacy for self regulated learning, and self efficacy for academic achievement -- and grades in a sample of 102 (52 male, 17% Asian, 34% Black, 23% Hispanic, 24% White) 9th and 10th grade students attending two high schools in lower middle class neighborhoods in a large city in the eastern U.S. Students completed self-efficacy measures shortly after the beginning of the semester. At the end of the semester, teachers provided students' final grades in social studies, and social studies grades for the prior year were obtained from school records. The study found a significant causal path between self-efficacy for self regulated learning, self-efficacy for academic achievement and grades. Specifically, students who perceived themselves as competent in strategically regulating their own activities were more confident regarding mastery of academic subjects and attained higher grades.

A more recent study examined the influence of various types of self-efficacy on grades and delinquency in a sample of Australian high school students (Carroll et al., 2008.) In addition to academic and learning self-efficacy (as examined in Zimmerman et al), the authors also investigated the influence of social self efficacy (perceived capability for self assertiveness and engaging in social interactions and relationships) and social self

regulatory efficacy (perceived capability to resist peer pressure and pressure to engage in risky activities) on self reported delinquency and teacher reported grades in English. The study sample included 935 students in grades 8-12 (454 male, mean age 14.35 years) from 10 socioeconomically diverse state schools in the cities of Perth and Brisbane, who were administered surveys in the middle of the academic year, prior to mid-year exams and grading. Results of this cross sectional study indicate a significant direct effect of academic self-efficacy on academic achievement and delinquency, with greater academic self-efficacy related to high grades and less delinquency. Social self-regulatory self-efficacy evidenced similar significant direct relationships with delinquency and achievement. Social self-efficacy, on the other hand, showed an unexpected negative relationship with academic achievement. The authors note that participants who reported lower social self-efficacy were those who did well in English, and suggest this finding may be the result of high school students' perception that being smart is "uncool."

In regard to help seeking, two studies have found students' help seeking perceptions, attitudes, and behaviors to influence academic performance. In a study of 844 middle school students (Ryan, Patrick, & Shim, 2005), help seeking as assessed by student and teacher reports in the 6th grade predicted math achievement in 7th grade. Specifically, appropriate help seekers had significantly higher math course grades and math standardized test scores than students with avoidant or dependent help seeking tendencies. Another study (Karabenick, 2003) found similar results in a sample of 883 university undergraduates enrolled in large chemistry classes. Among this group, avoidant help seekers showed poorer performance on course exams than adaptive help seekers as assessed by student self-report.

Perceived Autonomy in School and School Engagement

Perceived autonomy in school is generally assessed utilizing questionnaires that measure levels of various types of motivation or styles of self-regulation, conceptualized as a continuum of autonomy from extrinsic (behaving in order to attain a reward or avoid a punishment administered by others) to intrinsic (involvement with an activity because of the inherent pleasure or reward derived from the task itself) (Fredricks, Blumenfeld, & Paris, 2004; Tucker et al., 2002). The assumption is that students who are intrinsically motivated academically will feel more autonomous in school because school will enable them to engage in activities congruent with their genuine preferences and for their own personal reasons.

The Academic Motivation Scale (AMS), the measure of perceived autonomy in school to be utilized in the proposed study, also includes a subscale measuring amotivation, defined as a state where there is no relationship between one's behaviors and one's intentions in school and where a sense of personal causation is lacking.

A number of studies have found scores on the AMS to predict academic achievement. Guay and Vallerand (1996) investigated this relationship in a sample of 1098 tenth grade public school students in Canada (550 male, mean age 15.28 years) and found that AMS scores predicted academic achievement 8 months later, even when controlling for students' prior academic achievement. In addition to providing empirical evidence of a predictive relationship between the AMS and achievement, the study (Guay & Vallerand, 1996) also provides support for AMS scores as mediators in the relationship between school context and achievement, in that support from teachers and school administration influenced AMS scores. The school's social context influenced students'

sense of autonomy, such that the greater the support, the more autonomous they felt, and their sense of autonomy, in turn, predicted academic achievement 8 months later.

Empirical evidence from a variety of studies supports a role for perceived relatedness, competence, and autonomy cognitive self -variables in predicting school engagement outcomes. Measures of perceived school belonging, teacher support, classmate acceptance, academic self-efficacy, social skills, help seeking competency, and academic motivation have been found to be significant predictors of grades and other academic outcomes, including school behavior problems, suggesting that students' perceptions of both self and school context impact their success in school. Whether or not changes that can be made to these cognitive self-variables by some school-based mentoring programs play a role in generating academic program outcomes, however, is still an open question.

Chronological Review of Relevant Mentoring Study Findings

Mentoring programs exist in many settings including school, workplace, and community. A recent meta-analysis of mentoring studies across settings and populations (Eby, Allen, Evans, Ng, & DuBois, 2008) found mentoring to be associated with a wide range of positive outcomes related to behavior, attitudes, motivation, relationships, and achievement, although the effect sizes were generally small. Numerous program evaluations and empirical studies of youth mentoring exist in the literature, and provide some support for its use as one means of improving behavioral and academic outcomes in adolescent populations. A meta-analysis and review of more than 50 youth mentoring studies (DuBois, Holloway, Valentine, & Cooper, 2002) found a modest overall benefit to the average youth from participation in mentoring programs.

School-based mentoring (SBM) programs have proliferated recently, and it is estimated that more than 30% of all mentoring programs are school-based (Portwood & Ayers, 2005; Portwood et al., 2005; Rhodes, Grossman, & Resch, 2000). Several youth mentoring programs and studies are of particular note, and the results of these studies demonstrate the potential effectiveness of SBM programs.

Blum and Jones (1993) conducted one of the early investigations of SBM programs utilizing teachers as mentors. In that study, 22 seventh and eighth grade students at risk for dropout were each mentored by a teacher over the course of one school year. Mentors were to meet one on one with their mentee every school day, and mentoring activities included tutoring, monitoring student progress, acting as liaison, and sharing in recreational activities, particularly school extracurricular events. The program also included a group component, which involved weekly sessions and a structured curriculum of activities geared toward the development of self-esteem, goal setting and interpersonal skills, and improvement in academic performance.

Although no comparison group was used in the study, comparison of mentored students' grades and evaluations from the first and third quarters of school indicated an improvement in grades, classroom behavior, academic assignments and promptness to class. More significant improvements were made by students whose mentors interacted with them daily, monitored their academic progress, and elicited parental involvement.

Big Brothers Big Sisters of America (BBBSA) is the major mentoring program in the United States, serving more than 100,000 youth (Portwood & Ayers, 2005). BBBSA enlists volunteers from the community at large as mentors for youth through both community based and school-based programs. Results from a study of 1138 youth, aged

10 to 16 from 8 BBSA community based mentoring programs across the U.S. (Grossman & Rhodes, 2002) showed that youth who were in matches that lasted more than 12 months reported significant increases in their self worth, academic self-efficacy, valuing of school, peer acceptance and other areas. More than half (57.5%) of youth in this randomized controlled trial were members of minority groups, 62.4% were boys and more than 40% lived in households receiving food stamps and/or public assistance.

YouthFriends is an SBM program serving youth in grades K-12 in the Midwest region of the U.S. A study of 208 predominantly white students, grades 4-12, in the YouthFriends program (Portwood, Ayers, Kinnison, Waris, & Wise, 2005), utilized a non-randomized, pretest-posttest comparison group design to examine the impact of mentoring on cognitive and behavioral outcomes. Youth were involved in the intervention for a minimum of 8 months. Those students in the mentoring group had significantly higher levels of perceived school connectedness (sense of school belonging) after the intervention as compared to the control group. Those who entered the program with a GPA of 2.00 or below showed a statistically significant improvement in grades.

Hughes, Cavell, Meehan, Zhang, and Collie (2005) also found evidence suggesting mentoring may affect peer acceptance. The study included both community based mentoring (CBM) and school-based mentoring (SBM). A total of 174 second and third grade students identified as aggressive by their teachers, were randomly assigned to participate in one of two programs over the course of three school semesters (across two academic years- Spring Year1, Fall Year2, Spring Year2). PrimeTime was a multicomponent intervention that combined CBM of children, parent and teacher consultation, and school-based, group problem solving skills training for the children.

PrimeTime mentors received extensive training and supervision and were assigned as mentors to a child for the duration of the intervention (approximately 16 months) and scheduled to meet weekly with their mentee, outside of school hours for approximately one to two hours. The Lunch Buddy program was a stand-alone SBM intervention. Children in the Lunch Buddy program were paired with a new mentor each semester. Lunch Buddy mentors received a 90-minute orientation, but no formal training or supervision. Lunch Buddy mentors were to meet with their mentees twice weekly during mentees' scheduled lunch times. Mentors typically sat at a lunch table with their mentees and several other children for approximately 30 minutes. Lunch Buddy children received an average of about 50 mentor visits during the study. Mentors for both conditions were university students enrolled in a class in which course grades were tied to consistency of mentoring visits. The study found improvements in peer acceptance ratings at post treatment and follow up, among students in the Lunch Buddy SBM program but not the PrimeTime, multicomponent CBM intervention group, in this same sample.

A study of an intervention specifically designed to improve teacher-student relationships (Murray & Malmgren, 2005) highlights the important role teachers and teacher-student relationships can play, and the potential for interventions that improve these relationships. Though not labeled as a mentoring program per se, the intervention had many of the hallmarks of an SBM program, including many of the activities and targeted outcomes of a mentoring program.

Murray and Malmgren's (2005) randomized, controlled study of a 5-month SBM intervention involved 48 high school students (75% male, 100% African American) at a high poverty urban school. The sample was 48% freshmen, 29% sophomores, and 19%

juniors. All participants demonstrated significant emotional or behavioral problems, and 31% were receiving special education services. Students were nominated for the study by at least one of their teachers, who were also participating in the study. Teacher ratings of student behavior, social competence, school adjustment, and classroom engagement, collected before and after the intervention were analyzed. Grades in English, Mathematics, Science, and Social Studies (excluding grades from classes taught by teachers in the intervention) from the intervention semester and the preceding semester were collected and an overall grade point average (GPA) calculated.

Intervention activities were based in part on SBM programs (Anderson et al., 2004; Karcher, 2005) and included weekly meetings between teacher and student, monitoring of academic progress, increased positive feedback through praise and encouragement, goal setting and problem solving activities, and ongoing communication, including calls to the student's home. The intervention was designed with the participating teachers during two days of initial meetings, and the study coordinator met with each teacher participant on a biweekly basis. All log sheets and worksheets from student meetings were collected at the end of the 5-month intervention period and a brief teacher rating of fidelity of intervention implementation was administered. Those data indicated that 70% of intervention group students met with their teacher at least once per week, and all met at least 8 times.

Though the study found no significant post intervention differences between groups in teacher ratings of student behavior, social competence, school adjustment, and classroom engagement, there was a significant difference in grades of medium sized effect. While the grades in the control group were the same across the two semesters,

grades for students in the intervention group for the intervention semester improved significantly from the preceding semester. The authors note that all the other measures besides grades were based on participating teacher ratings, and there was no data gathered from students regarding their perceptions, and suggest that may provide some explanation for the lack of other significant findings.

In a study of academically at risk college freshmen (Larose, Tarabulsy, & Cyrenne, 2005), investigators examined the impact of mentee perceptions of relatedness and autonomy in their relationships with mentors on academic adjustment and performance. Forty students (80% female) received 10 one-hour mentoring sessions during the course of their first semester. Mentors were teachers at the college, and received one day of initial training as well as ongoing mentoring support, including weekly meetings with a study coordinator. Mentees completed written surveys assessing perceived autonomy and relatedness in their relationship with their mentor at the end of the first semester, after the conclusion of the mentoring program. Measures of academic performance, academic adjustment, and social adjustment were assessed before the start of the mentoring program and 5 months after the end of the mentoring program, at the end of students' freshman year.

Mentored students were divided into groups based on their ratings of autonomy and relatedness in their relationships with their mentors. These groups were compared to each other, and to a comparison group that did not receive mentoring, to identify any differences in academic performance or academic or social adjustment. No pretest differences in these areas were found among the three groups at pretest. After mentoring, however, the study found that mentored students who rated their mentoring relationships

as low in either relatedness or autonomy, scored significantly worse on all measures than those who rated their relationships highly and those who were not mentored.

These results indicate that specific school-related cognitive self-variables can have significant impact on mentoring effectiveness. Furthermore, the results of this study provide evidence that student perceived autonomy and relatedness in the mentoring relationship (components of the self-systems processes model) can moderate the impact of a mentoring program, and that a lack of positive perceptions in these domains appears to have detrimental effects on academic outcomes.

A randomized study of ten BBBSA SBM programs across the nation, involving 1139 low income, at risk youth in grades 4 through 9 at 71 different schools (Herrera, Grossman, Kauh, Feldman, & McMaken, 2007) found that after an average of 5 months of weekly mentoring, teachers reported greater improvements in academic performance, school conduct, and attendance in mentored youth as compared to their non-mentored peers. Mentored students also reported increased academic self-efficacy. The effect sizes were small, but the findings were statistically significant.

A study of mentoring in a learning environment (SMILE) (Karcher, 2008), examined the “additive” effect of providing SBM. Utilizing a randomized design, 516 predominately Latino, female youth, aged 10 to 18, attending 19 public schools in the U.S. southwest were assigned to receive either supportive services (consisting of such services as tutoring, group counseling, and enrichment activities) and one hour per week of SBM, or supportive services alone. Students in the mentoring group met with their mentors an average of 8 times, and improved in their self reported self esteem, connectedness to peers, and social support from friends, relative to those who received

supportive services alone. The study did not find mentoring to have a significant impact on grades or attendance.

Holt et al. (2008) utilized the Achievement Mentoring Program investigated in the current study, in a randomized, controlled trial with a sample of 40 at risk, urban, minority (47% Latino, 38% African American) 9th grade high school students. Ten mentors (8 teachers and 2 school counselors) each mentored 2 students. This 5-month SBM program included weekly one on one meetings, monitoring of mentees' academic performance, and mentor communication with mentees' parents and teachers, plus another semester of booster sessions. (See Method section for a more detailed description of intervention activities.)

The authors found mentors met with their mentees an average of 8 times during the intervention, with 70% adherence to program procedures. Students' sense of school belonging, perception of teacher support, academic motivation, and academic self-efficacy were assessed using written surveys completed by participating students before and after the intervention. Grades, attendance and discipline referrals were gathered from school records after the end of each semester. Compared to those who did not receive the SBM intervention, mentored students exhibited a significantly lesser decline in perceived teacher support, and mentored students were also significantly less likely to enter the discipline system during the intervention semester.

A replication and extension of Holt et al. (Clarke, 2009) utilized the same Achievement Mentoring Program and similar study design in a second randomized, controlled trial in a sample of 38 at risk, urban, minority (79% African American, 18% Latino) 9th grade high school students. Again, this study found the intervention to have a

significant impact on mentored students' perception of both teacher support and peer acceptance. There was also a significant reduction in self-reported negative school behavior and discipline referrals in the following school year compared to the non-mentored control group, as well as a significant difference in grades in mathematics and language arts by the end of that following school year.

The most recently published study of an SBM program utilizing school personnel as mentors (Converse, 2009) also found that relationship quality impacted outcomes, specifically disciplinary referrals. This randomized, controlled study, in a predominantly male (more than 80%), ethnically mixed (approximately half white and half Hispanic) sample of 32 junior high school students at risk of referral for behavioral disabilities, found that an 18 week SBM intervention conducted during the second half of the school year resulted in a significant reduction in disciplinary referrals and a significant increase in school connectedness (including an increase in peer, teacher, and other school personnel subscale scores) in mentored students compared to control group students.

This group of studies provides a small but solid base of empirical evidence indicating mentoring interventions can have a beneficial impact on academic outcome and school behavior. Significant effects on grades and other school engagement related behaviors were found for these interventions when administered to students of various ages, grades, ethnicities, and across levels of income, academic achievement and academic risk.

School-based Mentoring Interventions and Cognitive Variables

Empirical support for the significance of relationships of cognitive self variables is also found in the results of mentoring intervention studies. In regard to relatedness,

results from at least seven studies suggest mentoring interventions impact students' perceptions of school-related belonging and connectedness. Both Holt et al. (2008) and Clarke (2009) found more positive perceptions of teacher support, as measured by the PSSM, among mentored students as compared to controls, and Clarke (2009) also found positive effects on peer acceptance. The YouthFriends study (Portwood et al., 2005) found significant differences in PSSM scores between students who participated in an 8-month mentoring intervention and a comparison group. Karcher's (2005) study also found that connectedness to school was greater among mentored middle school students than a comparison group. Converse (2009) found that after an 18-week mentoring program, mentored students had higher overall scores on a measure of school connectedness, as well as higher scores for all subcategories of school connectedness, including connectedness to teachers, other adults in school, and peers.

Further support for the impact of mentoring interventions on peer acceptance is provided by a study of aggressive 2nd and 3rd graders (Hughes et al., 2005), which found that after three semesters of participation in a school-based mentoring program consisting of twice weekly lunchtime cafeteria visits by an undergraduate mentor, teacher ratings of peer acceptance were higher for these mentored students relative to a comparison group. Lastly, LaRose (2005) found that in a sample of at risk Canadian college freshmen, students' perceptions of relatedness in their relationship with their mentor moderated the impact of the mentoring intervention on academic adjustment and performance, with mentored students who reported low relatedness exhibiting lower academic performance than a non-mentored comparison group and mentored students who reported high relatedness in their mentoring relationships. This study also provides support for the role

of perceived autonomy in regard to mentoring interventions and academic outcomes, in that, similar to relatedness, mentored students who reported low perceived autonomy in their relationships with their mentors exhibited lower academic performance than non-mentored students, and mentored students who reported high autonomy in their mentoring relationships. Thus, both perceived relatedness and perceived autonomy acted as moderators of the effects of this mentoring program on academic outcomes.

Though several studies have examined the effects of mentoring interventions on both cognitive variables and behavioral outcomes, no study has examined cognitive variables as mechanisms of change in randomized, controlled trials of a mentoring intervention. The aim of the proposed study is to examine self-report measures of perceived competence, relatedness and autonomy, as potential mechanisms of change in a school-based mentoring intervention (Achievement Mentoring) that has shown effects on school behavior, such as academic performance and discipline referrals, in a group of urban, low income, ethnic minority high school students.

Previous studies (Clarke, 2009; Holt et al., 2008) have found this school-based mentoring intervention to have significant effects on school behaviors, as well as cognitive variables such as sense of school belonging. Empirical results from numerous other studies (Goodenow, 1993; Guay & Vallerand, 1996; Hughes et al., 2005; Karcher, 2008; Larose et al., 2005; Portwood et al., 2005; Tucker et al., 2002; Urga, 2003) provide evidence that these cognitive factors are significantly related to mentoring interventions as well as behavioral outcomes. Thus, it is hypothesized that these cognitive variables act as mediators of the effects of the intervention on academic and school behavior outcomes

and can be conceptualized as mechanisms of change. Specifically, it is hypothesized that:

- 1) The mentoring intervention will have a significant effect on school behavior and academic outcomes with students participating in the intervention demonstrating less negative school behavior and higher grades than randomly assigned controls.
- 2) The intervention will have a significant positive impact on measures of cognitive variables related to students' self-perceptions (e.g., decision making, self efficacy, academic motivation, sense of school belonging).
- 3) Changes in cognitive measures will be significant predictors of academic and behavioral outcomes, and mediate the effects of the intervention on grades and school behavior.

Method

Design

The current study will examine data from randomized, controlled trials of a school-based mentoring intervention. The data set for the analyses is composed of data from three separate trials of a mentoring intervention for at risk youth. Data from the first trial were reported in Holt et al. (2008), and data from the second were reported by Clarke (2009). Data from the third trial are reported for the first time here. These trials were conducted within the context of a larger study of an integrated, school-based, prevention program, which also included a universal peer-led group program (Johnson, Holt, Bry, & Powell, 2008).

Participants

Participants were 124 ninth grade students from two large, urban, public high schools in the mid-Atlantic region of the U.S. More than two-thirds of the students at these schools qualified for free or reduced price lunch. All participants had been identified as at risk for school dropout by staff in their school, based on a student's exhibition of at least two of the following risk factors: discipline problems, attendance problems, or low grades and/or low academic motivation. The majority of students in the sample identified as Latino (57%, $n=71$) or African American (33%, $n=41$), with those identified as Caucasian (2%, $n=2$), Asian (2%, $n=2$), and "Other" (6%, $n=7$) also represented. Information on ethnicity was not available for one student in the sample. The sample was 53% male and had a mean age of 14.48 years ($SD = .668$).

Procedures

Data were collected at multiple time points. Students completed written surveys, including measures of the hypothesized cognitive mediators, during the first term of their Freshman year (pretest), prior to being identified as at risk, as part of a larger study (Johnson et al., 2008). The university Institutional Review Board approved all data collection and analysis procedures. After being identified as at risk and stratified by gender and race/ethnicity, participants were randomly assigned to either the intervention group (n=72) or control group (n=52). (The groups differ in size due to the fact that at one school, students were randomly assigned to mentoring and control groups in a 1:1 ratio; in the other, the random assignment ratio was 2:1, with twice as many students assigned to the mentoring group.) The intervention group participated in the 5-month Achievement Mentoring Program (AMP) during the second half of the academic year, with booster sessions provided during their second year in high school. Written surveys were completed again at the end of the first academic year (posttest1). All students had the option of taking a Spanish version of the survey. The survey was written at a fifth grade reading level; any student in the sample indicating reading difficulties was provided with assistance in completing the survey, such as having survey questions read to them. In one school system, students were compensated with school store coupons and snacks each time they participated in the survey. Only snacks were provided in the other school system. Behavioral and academic performance data, including discipline referrals, and grades in language arts, mathematics, and social science, were collected from the schools for the fall terms of students' first (pretest) and second year (posttest2).

Achievement mentors were recruited through a brief presentation to faculty and selected on the basis of their completed application, completion of a three-hour training, and ability to fulfill the time commitment required by the AMP. A total of 40 mentors participated (including five who mentored during two trials of this study). Sixty three percent were female, 11 were African American, 1 was Asian American, 18 were Caucasian, and 10 were Latino. Eighty seven percent were teachers and 13% were guidance counselors or social workers. Mentors attended a 3-hour training session at the end of the first half of the academic year. Then mentors met with AMP coordinators once a week or once every other week (during the third trial) in school during the second half of the academic year, mentors described and discussed activities and issues related to implementing the mentoring program and their mentees. In one school system mentors received a stipend; they received professional development hours for their participation in both school systems.

AMP Intervention

The Achievement Mentoring Program (AMP) (Bry, 2000) is a manualized, school-based, mentoring intervention for high school students adapted from Bry's Behavioral Mentoring and Reinforcement Program (BMRP) (Stanley, Goldstein, & Bry, 1976), a preventive intervention for middle school students identified as "effective" by the Office of Juvenile Justice and Delinquency Prevention (2008) and "promising" by the Substance Abuse and Mental Health Services Administration (2008). Evaluations of BMRP provide evidence that it contributes to improvement in attendance and grades, and reductions in delinquency (Bry, 1982; Bry & George, 1980). In addition, evaluations of the AMP have shown positive effects of program participation related to sense of school

belonging, decision making, discipline referrals, and dropout (Bry, 2001; Holt et al., 2008).

As part of the AMP, mentors were instructed to carry out the following activities on a weekly basis: 1) Talk with one of the mentee's teachers to learn one positive thing the student did that week and to learn about upcoming assignments; 2) Meet with the mentee for 15-20 minutes, to acknowledge one positive accomplishment made by the mentee during the week and to problem solve with student around how to maintain this positive behavior and complete future assignments; 3) Practice an important and relevant behavior with the mentee (such as organizing a notebook together, doing homework together, or having a mentee rehearse speaking with a teacher or parent); and 4) Follow the student's attendance record, tardy arrivals to school, discipline referrals, and report cards, and discuss these with the mentee. Mentors notified the mentee's teachers, guidance counselors, and administrators of their mentoring relationship with the student. Mentors also contacted the mentee's parents once per month to convey one positive behavior exhibited by the mentee. Mentors learned about the long-term plans, goals and aspiration of the mentee, and were encouraged to meet with the mentee at least once a month for booster sessions during the next academic year, after the end of the 5-month program.

AMP Dosage and Adherence Monitoring

In the first of the three trials included in the current study (see Holt et al., 2008), mentors met with their mentees for 8 weeks on average (range 2-13 weeks), out of a maximum possible 13 weeks during the second half of the first academic year. Meetings lasted an average of 20-30 minutes. Mentors consulted with AMP coordinators an

average of 9 (range 8-11) of the 13 AMP coordinator visits during the first semester of intervention. Based on information from these meetings, the two program coordinators rated whether the mentor engaged in each of 10 manualized program procedures. Inter rater reliability was 100%. Mentors adhered to 70% of program procedures on average, during weeks when they met with both program coordinators and their mentees during the first trial of the study. During the second trial, mentor adherence was 75%, and mentor adherence increased to an average of 84% during the third trial in the study. During the second trial, mentors met with mentees an average of 7 times (range 1-9) and the average meeting was 21 minutes (range 5-45). Dosage (whether or not mentees were seen during the week) was monitored during only 4 of the weeks of the third trial. The average number of those 4 weeks when mentees were seen by mentors was 3 of those 4 weeks (range 1- 4). Number of minutes that mentees were seen during each meeting was not recorded during the third trial. Because study analyses included participants even if they had only one mentoring session, the analyses were “intent to treat.”

Measures

Demographic data, including age, gender, and race/ethnicity, were obtained via the pretest survey administered in the first half of participants’ freshman year.

Potential Cognitive Mediators

Academic Motivation Scale (AMS) (Vallerand et al., 1992, 1993). The AMS is a 20-item questionnaire with four items in each of five subscales: intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation. Items illustrate possible answers to the question “Why do you go to school?” In the current study, a modified instrument was used that included the four amotivation subscale items

(e.g. “I can’t see why I go to school and honestly couldn’t care less” [reverse scored]), and three items each from the intrinsic motivation subscale (e.g. “for the pleasure I get when I discover new things I didn’t know before”) and identified regulation subscale (e.g. “in order to have a better paying job later on”). Each item was rated on a 4-point Likert-type agreement scale. The scale used contains three items that were reverse scored because of the valence of the wording. Higher scores indicate higher reported motivation. Internal consistency (as measured by Cronbach’s alpha) for the scale in the current study was adequate ($\alpha=.75$)

A number of measures related to perceived competence were examined, including Zimmerman’s *Self-efficacy for Self-regulated Learning Scale* (Zimmerman, Bandura, & Martinez-Pons, 1992), a *Skill Belief Scale* assessing social and life skills (McNeal & Hansen, 1999), and three items assessing help seeking from the *Multidimensional Scales of Perceived Self-efficacy* (Bandura, 1990). Zimmerman’s scale asks students to rate the extent to which they are able to use learning and study strategies such as “concentrate on school subjects” and “plan your school work”, on a scale from 1 (not well at all) to 4 (very well). Internal consistency for this scale in the current study ($\alpha=.84$) was comparable to the value obtained by Zimmerman et al. (1992) ($\alpha=.87$) and by Holt et al. (2008) ($\alpha=.85$) in previous studies of this population. The three help seeking items investigate how well students are able to enlist help with problems from family, friends and teachers (e.g. “how well can you get a teacher to help you when you get stuck on schoolwork”) and are rated on the same 1 to 4 scale. Internal consistency for this scale was adequate ($\alpha=.71$) in the current study. The 5 social skill items are rated on a scale from 1 (disagree) to 4 (agree) and include items such as “if I want my friends to go along

with me, I know what to say to them” and “it’s very easy for me to make new friends”.

Internal consistency for this scale was low ($\alpha = .60$) in the current study

Relatedness was assessed using two measures. The *Psychological Sense of School Membership Scale* (PSSM)(Goodenow, 1993) measures general sense of school belonging. The version utilized in the current study contained 13 items (e.g. “Other students here like me the way I am”, “Teachers here are not interested in people like me” [reverse scored], “I feel proud of belonging to this school”) rated on a 4-point Likert type agreement scale. Four of the items were reverse scored due to the valence of the wording. Higher scores indicate greater sense of belonging. Internal consistency for the PSSM in this study was good ($\alpha = .74$). In addition, the *Classmate Acceptance Scale* (Urga, 2003) consisting of 6 items, rated on a scale from 1 (disagree) to 4 (agree), assessing relationship with classmates (e.g. “I am encouraged to do well by my classmates”, “my classmates get me to think about my values and feelings”) was examined as well. In the current study, internal consistency for the scale was good ($\alpha = .83$).

Behavioral and Academic Measures of School Engagement

After the end of each of the fall semesters (pretest, posttest2) [beginning with the Fall term in which they were nominated for participation,] information on discipline referrals and grades was collected for each participant. Total number of referrals that resulted in discipline action was summed for each participant for each of the two semesters. Average semester grades (0-100) in Math, Language Arts, and Social Studies or Science, were also calculated for each student.

Data Analytic Strategy

Baseline (T1 pretest) data were used to compare the randomly assigned mentored and non-mentored groups and test for any statistically significant differences in demographic and pretest study variables between the intervention and control groups. Correlation matrix analyses were conducted to test for multicollinearity and identify covariates.

Regression analyses were utilized to test for significant effects of the intervention and mediators. Classic mediation models require: 1) a direct effect of the intervention on the distal outcome 2) a direct effect of the intervention on the hypothesized mediators 3) a direct effect of the mediators on the outcome and 4) obviation/reduction of the direct effect of the intervention on the outcome when mediators are included in the model (Baron & Kenny, 1986; MacKinnon, 1994, 2008). Therefore, the following regression analyses were conducted: 1) In separate regression analyses, posttest2 discipline referrals and grades in language arts, mathematics, and science or social studies were each regressed individually onto AMP group status, gender, school, and pretest measure of the dependent variable; 2) In separate regression analyses, posttest1 – pretest change scores for cognitive mediators (i.e. AMS, PSSM, Classmate Acceptance Scale, Social Skill Scale, Academic Self-Efficacy Scale, and Help-Seeking Efficacy) were regressed onto AMP group status, gender, and school; 3) For outcome and mediator variables with significant results in steps 1 and 2, each outcome variable was regressed separately onto change scores of the significant cognitive mediators, and 4) In separate analyses, outcome variables with significant results in the previous steps were regressed onto AMP group status, change scores of the significant cognitive mediator variables, gender, school, and pretest measure of the dependent variable. Results will be interpreted as indicative of

mediation if a significant effect of AMP group status on a posttest2 outcome found at Step 1 is substantially reduced when the change score for a cognitive mediator (found to have significant relationships in Steps 2 and 3) is included in Step 4.

Results

Pretest Comparison of Randomized Study Groups By Condition Assignment

The 72 participants randomly assigned to the mentoring group were compared to the 52 participants randomly assigned to the control group on demographic variables and cognitive and behavioral measures at pretest, using t and chi square tests. With the exception of different randomization schemes at the two different schools (at one school, students were randomly assigned to mentoring and control groups in a 1:1 ratio; in the other, the random assignment ratio was 2:1, with twice as many students assigned to the mentoring group,) yielding different distributions of mentored versus control participants by school, there was no statistically significant difference found between the study groups at pretest on any variables (see Table 1).

Correlations

In order to examine relationships among the study variables for all participants, bivariate correlations were calculated among demographic variables, behavioral variables measured at T1 pre-test and T3 follow-up, and change scores of cognitive variables (T2 post-test – T1 pre-test) (See Table 2). Regarding demographic variables, school was significantly correlated with study group ($r = -.22$, $p = .015$, $N = 124$) due to the differing randomization schemes across schools in the study, as previously mentioned. Ethnicity (dichotomized as Hispanic or not Hispanic) was significantly correlated with school ($r = -.60$, $p < .001$, $N = 123$) and both school and ethnicity were significantly correlated with discipline referrals at both T1 ($r = -.61$, $p < .001$, $N = 119$; $r = .37$, $p < .001$, $N = 119$) and T3 ($r = -.52$, $p < .001$, $N = 95$; $r = .34$, $p = .001$, $N = 95$). The ethnic makeup of

Table 1

Pretest Comparison of Randomized Study Groups

		Overall Sample (<i>N</i> = 124)		Mentored (<i>n</i> = 72)		Control (<i>n</i> = 52)	
Variable		<i>M</i> or %	<i>SD</i>	<i>M</i> or %	<i>SD</i>	<i>M</i> or %	<i>SD</i>
Ethnicity	Age	14.48	.668	14.46	.604	14.50	.754
	Male	53.2		51.4		55.8	
	*School A	60.5		51.4		73.1	
	Attrition	34.0		33.0		35.0	
	Hispanic	57.3		56.9		57.7	
	Black	33.1		31.9		34.6	
	Asian	1.6		2.8		0	
	White	1.6		1.4		1.9	
	Other	5.6		6.9		3.8	
	N/A	.8		0.0		1.9	
Behavioral Measures (Time 1)	Discipline Referrals	2.72	3.73	3.11	4.21	2.22	2.95
	English	67.22	12.52	68.20	11.93	65.89	13.29
	Math	65.35	12.95	64.37	11.69	66.69	14.50
	Social Science	63.95	15.74	65.83	13.49	61.40	18.18
Cognitive Measures (Time 1)	AcaMot	3.53	.402	3.51	.40	3.56	.41
	PSSM	3.165	.464	3.13	.47	3.21	.46
	ASE	2.82	.693	2.72	.69	2.94	.68
	HelpSeek	2.94	.824	2.86	.78	3.04	.88
	ClassAcc	2.72	.749	2.73	.75	2.69	.76
	SocSkill	3.42	.507	3.39	.50	3.45	.52

Note. AcaMot = Academic Motivation, PSSM = Psychological Sense of School Membership, ASE = Academic Self-Efficacy, HelpSeek = Help Seeking, ClassAcc = Classmate Acceptance, SocSkill = Social Skill.

* $t(122) = 2.48, p = .015$.

Table 2

Correlations of Demographic, Cognitive, and Behavioral Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Study Group	--																
2 School	-.22*	--															
3 Hispanic	-.02	-.60***	--														
4 Gender	-.04	-.03	.03	--													
5 T1 Disc.	.14	-.61***	.37***	-.01	--												
6 T3 Disc.	.05	-.52***	.34**	.18	.64***	--											
7 T1 Eng	.09	.12	-.08	-.08	-.33***	-.30**	--										
8 T3 Eng	.14	-.12	-.06	-.13	-.03	-.10	.23*	--									
9 T1 Math	-.09	-.12	.04	-.03	-.14	-.13	.41***	.21*	--								
10 T3 Math	-.06	-.05	.06	-.06	-.03	-.21	.18	.53***	.33**	--							
11 T1 SocSci	.14	-.07	-.12	-.09	-.16	-.19	.35***	.17	.48***	.33**	--						
12 T3 SocSci	-.08	-.03	-.07	-.15	.05	-.11	.25*	.45***	.23*	.61***	.44***	--					
13 ΔAcaMot	-.05	-.15	.03	.08	.05	-.13	-.01	-.06	-.06	-.17	-.05	-.12	--				
14 ΔPSSM	.08	-.11	-.07	-.01	.10	.03	.01	.16	.05	.14	.13	.12	.40***	--			
15 ΔASE	.15	.11	-.14	.09	-.16	-.17	.16	.00	.10	.03	-.08	-.23*	.22*	.28**	--		
16 ΔHSeek	.12	-.03	.09	-.03	.03	-.13	.12	.08	.01	.16	-.08	-.03	.12	.27**	.49***	--	
17 ΔClAcc	-.09	.16	-.11	-.09	-.11	-.07	-.03	-.01	-.09	-.17	-.01	-.13	.05	.14	.08	.02	--
18 ΔSSkill	-.02	.05	.02	-.02	-.06	-.20	.07	-.07	.10	.02	.10	-.04	.19	.18	.17	.22*	.12

Note. T1 = Time 1, T3 = Time 3, Δ = change T1 to T2. AcaMot = Academic Motivation, PSSM = Psychological Sense of School Membership, ASE = Academic Self-Efficacy, HSeek = Help Seeking, ClAcc = Classmate Acceptance, SSkill = Social Skill.

* $p < .05$, ** $p < .01$, *** $p < .001$.

samples differed by school as well, with 98% of school B participants (and student body) of Hispanic ethnicity.

Among the behavioral variables, scores at T1 were significantly correlated with scores at T3 for each of the respective variables, including discipline referrals ($r = .64, p < .001, N = 95$), and grades in English ($r = .23, p = .028, N = 90$), Math ($r = .33, p = .004, N = 76$) and Social Science ($r = .44, p < .001, N = 90$). In addition, there were a number of significant correlations found across behavioral variables. Discipline referrals at T1 and T3 were each significantly negatively correlated with T1 English grades ($r = -.33, p < .001, N = 115$ and $r = -.30, p = .003, N = 94$ respectively). T1 English grades were significantly correlated with T1 Math ($r = .41, p < .001, N = 120$), T1 Social Science grades ($r = .35, p < .001, N = 120$) and T3 Social Science grades ($r = .25, p = .016, N = 90$). T3 English grades were significantly correlated with T1 Math ($r = .21, p = .043, N = 90$), T3 Math ($r = .53, p < .001, N = 76$) and T3 Social Science ($r = .45, p < .001, N = 88$) grades. T1 Math grades were also significantly correlated with Social Science grades at T1 ($r = .48, p < .001, N = 120$) and T3 ($r = .23, p = .033, N = 90$), as were T3 Math grades ($r = .33, p = .004, N = 76$ for T1 Social Science grades; $r = .610, p < .001, N = 74$ for T3 Social Science grades).

No statistically significant correlation between any of the behavioral measures and any cognitive variable change score was identified. Among the cognitive change variables, change in Academic Motivation was significantly correlated with change in PSSM ($r = .40, p < .001, N = 101$) and change in ASE ($r = .22, p = .030, N = 101$). Change in PSSM was also significantly correlated with change in ASE ($r = .28, p = .004, N = 101$) and Help Seeking ($r = .27, p = .007, N = 101$). Change in ASE and Help

Seeking were also significantly correlated ($r = .49, p < .001, N = 103$), as were change scores for Help Seeking and Social Skill ($r = .22, p = .028, N = 103$).

Participant Flow

As displayed in the flow chart in Figure 1, initial, T1 grade and discipline records were available for 115 of the participants randomized in the study. Of these, post-test questionnaires were available for 105 participants. At follow-up during the third semester of the study, report cards and/or discipline records were unavailable for 23 participants. In total, 84 (49 mentored and 35 control) participants were active, in that they were missing none of the requisite data at T1 or T2, and they had discipline referral and report card data available at T3. In addition, 19 participants with report card data available at T3 did not have grades available for all three subjects. Participants were included in a regression analysis if they were not missing data at T1 or T2 and the requisite data at T3 for that analysis was available.

Attrition Analyses

Students for whom T2 and T3 follow-up data were available were deemed active participants, and those for whom either T2 or T3 data were missing were considered attrited. Chi-square tests showed no statistically significant difference between active and attrited participants in regard to attrition rate, gender, ethnicity, or school. Two tailed t tests revealed no statistically significant difference between these two groups in any of the cognitive variables as measured at T1-pretest in this study (see Table 3).

Active and attrited participants differed significantly on a number of behavioral variables as measured at T1-pretest (see Table 3). A significant difference in social science grades was found ($t(118)=3.943, p<.001$.) Active participants averaged a score

Figure 1.

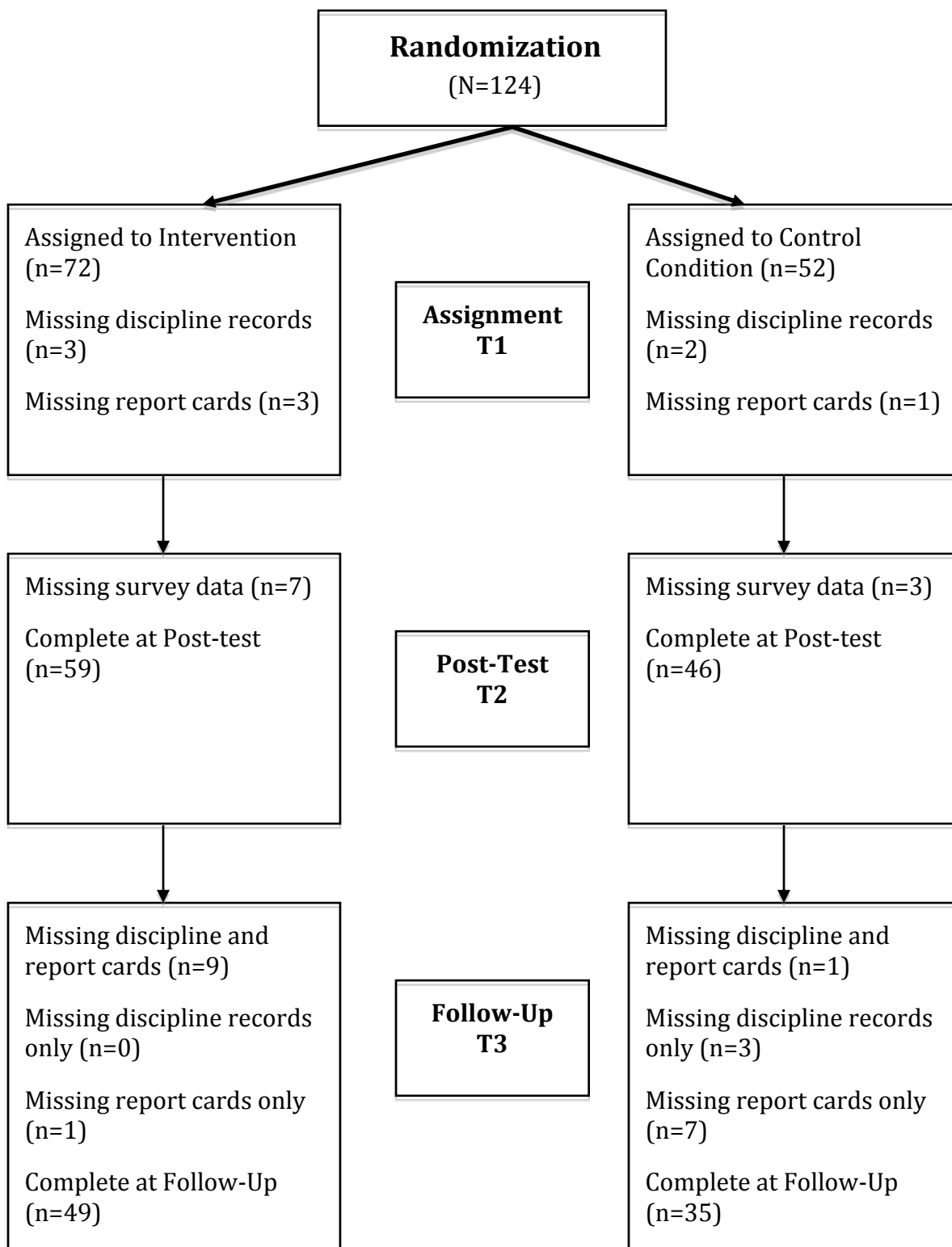
Study Participant Flow

Table 3

Attrition Analysis of Study Participants

			Active		Attriter		
			(n=84)		(n=40)		
Variable		Range	M	SD	M	SD	t
Behavioral Variables							
	Discipline Referrals	0 -17	2.20	3.22	4.64	4.85	-.319**
	English Grades	25.5 – 94.0	68.37	12.32	64.43	12.74	1.577
	Math Grades	32.0 to 95.5	67.06	13.01	61.20	11.99	2.295*
	Social/ Science Grades	4.00 to 93.5	67.38	12.43	55.61	19.61	3.943***
Cognitive Variables							
	AcaMot	2.18 - 4	3.54	.375	3.51	.46	.447
	PSSM	1.62 – 4	3.15	.47	3.20	.45	-.548
	ASE	1 – 4	2.78	.68	2.89	.73	-.744
	HelpSeek	1-4	2.94	.82	2.94	.83	-.013
	Class Acc	1 – 4	2.69	.71	2.78	.835	-.498
	Soc Skil	1.80 - 4	3.43	.52	3.38	.47	.501

Note. AcaMot = Academic Motivation, PSSM = Psychological Sense of School Membership, ASE = Academic Self-Efficacy, HelpSeek = Help Seeking, ClassAcc = Classmate Acceptance, SocSkil = Social Skill.

* $p < .05$, ** $p < .01$, *** $p < .001$

of 67.4 ($SD=12.43$) in social science classes during the first semester of their freshman year, while the mean score in social science classes for participants who attrited was 55.61 ($SD= 19.61$) during that semester. The groups also differed significantly in their math grades for that semester ($t(118)= 2.295, p=.02$) with active participants having a mean math score of 67.1 ($SD=13.01$) and attrited participants having mean math score of 61.2 ($SD=11.99$). These groups also differed significantly in mean number of discipline referrals during the pretest semester ($t(117)= -3.186, p=.002$). Active participants received a mean of 2.2 discipline referrals ($SD=3.22$), while the attriter group averaged more than twice that number ($M=4.6, SD=4.85$.)

Mediation Analysis

Step 1 – Independent Variables as Predictors of Outcome Variables

Separate hierarchical regression analyses were conducted with each of the four behavioral variables (discipline referrals, grades in English, Math, and Social Science) at Time 3 serving as the dependent variable. In each of these regression analyses, study group (mentored versus control), school (school A or School B), gender, and score for the behavioral variable at Time 1 were included as independent variables to test for significant main effects of these variables. In addition, product terms created by combining mentoring study group with the other independent variables were included in a second step for each regression, in order to test for significant interaction effects between study group and the other independent variables included in the regression. The Time 1 behavioral variable scores were centered around their respective means to reduce collinearity with interaction variables. Ethnicity was not included as a predictor in any of

the models presented, as it was found to have no impact in preliminary analyses and was confounded with the School variable (94% of the sample from School B was Hispanic.)

Assumptions of normality, linearity, and homoscedasticity were evaluated for all regression variables. Analysis of diagnostic plots and statistics in SPSS indicated sufficiently normal distributions, linear relationships, and homoscedasticity were found, and no violation of these assumptions was identified. Tolerance values were all significantly different than zero. In regard to outliers, data were evaluated for both univariate and multivariate outliers. For multivariate outliers, a p value of less than .001 for Mahalanobis distance was used as criterion and no outlier was identified. Univariate outliers among independent variables were evaluated by direct examination of score distributions, including histograms and box plots. Univariate outliers in the distributions of dependent variables were also evaluated by examining standardized residuals, utilizing a cutoff of ± 3.3 . For one dependent variable, discipline referrals at Time 3, three significant outliers were identified and those cases were excluded from the regression analyses involving that variable.

Grades

Results of the regression analysis with Time 3 English grades as the dependent variable are summarized in Table 4. Adjusted R^2 for step 1 was .053, $F(4, 79) = 2.303$, $p = .070$. As these values did not meet the significance criterion of $p < .05$, further evaluation and interpretation of coefficient values was not pursued.

For Math grades at Time 3, adjusted $R^2 = .063$, $F(4, 65) = 2.279$, $p = .070$ for step 1. These values also did not meet the $p < .05$ significance criterion; thus results were not evaluated further. Results for this regression analysis are summarized in Table 5.

Table 4

Regression Third Semester English Grades (N = 84)

Variable	Coefficients			95% CI		Squared Part Correlation
	B	SE B	β	Lower	Upper	
Gender	-3.823	3.465	-.114	-10.712	3.066	.013
School	-4.500	3.645	-.132	-11.748	2.747	.016
Mentoring	2.826	3.604	.084	-4.340	9.992	.007
English Sem1	.308	.140	.230*	.029	.587	.051

Note. Adjusted $R^2 = .053$, $F(4, 79) = 2.303$, $p = .070$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5

Regression – Third Semester Math Grades (N = 70)

Variable	Coefficients			95% CI		Squared Part Correlation
	B	SE B	β	Lower	Upper	
Gender	-1.608	3.508	-.051	-8.602	5.386	.003
School	-.614	3.702	-.019	-7.995	6.768	.000
Mentoring	-1.345	3.657	-.042	-8.637	5.947	.002
Math Sem1	.391	.137	.323**	.117	.665	.101

Note. Adjusted $R^2 = .063$, $F(4, 65) = 2.279$, $p = .070$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

The regression analysis with Time 3 grades in Social Science as the dependent variable yielded statistically significant results. Adjusted R^2 for step 1 was .197, $F(4, 79) = 6.134, p < .001$. Among the independent variables in step 1 of the model, only first semester Social Science grades were found to be a statistically significant predictor of third semester Social Science grades ($\beta = .453, p < .001, 95\% \text{ CI } .249 \text{ to } .613, sr^2 = .190$). Results for step 2 of the regression were not statistically significant ($\Delta R^2 = .023, F(7, 76) = 1.189, p = .483$); so those results are not reported. See Table 6.

Discipline Referrals

Several statistically significant predictors were identified in the regression model for discipline referrals (see Table 7). In the first step of this model, the adjusted R^2 value of .47 ($F(4, 76) = 21.142, p < .001$) indicates that 47% of the variability in discipline referrals at Time 3 is predicted by gender, school, mentoring study group, and Time 1 discipline referrals together. Each of these independent variables was a statistically significant predictor in this step of the model. Male gender predicted higher discipline referrals ($\beta = .214, p = .006, 95\% \text{ CI } .266 \text{ to } 1.580, sr^2 = .045$), as did attending school B ($\beta = -.306, p = .002, 95\% \text{ CI } -2.217 \text{ to } -.505, sr^2 = .058$). Previous discipline referrals were also a significant predictor of discipline referrals at Time 3 ($\beta = .436, p < .001, 95\% \text{ CI } .143 \text{ to } .364, sr^2 = .122$.) Assignment to mentoring predicted lower discipline referrals ($\beta = -.212, p = .008, 95\% \text{ CI } -1.601 \text{ to } -.250, sr^2 = .043$) indicating that the mentoring program had a statistically significant effect in reducing school discipline problems among participants in that group. In terms of the test of mediation, these statistically significant results satisfy the requirement that the independent variable (mentoring) have

Table 6

Regression – Third Semester Social Science Grades (N = 84)

Variable	Coefficients			95% CI		Squared Part Correlation
	B	SE B	β	Lower	Upper	
Gender	-3.520	2.853	-.118	-9.192	2.152	.014
School	-1.180	2.972	-.039	-7.090	4.730	.001
Mentoring	-4.791	2.967	-.159	-10.690	1.107	.023
Soc. Sci. Sem1	.431	.092	.453***	.249	.613	.190

Note. Adjusted $R^2 = .197$ $F(4, 79) = 6.134$ for Step 1, $p < .001$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7

Regression – Third Semester Discipline Referrals (N = 81)

Variable	Coefficients			95% CI		Squared Part Correlation
	B	SE B	β	Lower	Upper	
Gender	-3.520	2.853	-.118	-9.192	2.152	.014
School	-1.180	2.972	-.039	-7.090	4.730	.001
Mentoring	-4.791	2.967	-.159	-10.690	1.107	.023
Soc. Sci. Sem1	.431	.092	.453***	.249	.613	.190
Gender	-7.261	4.439	-.243	-16.092	1.569	.024
School	-1.271	4.994	-.042	-11.206	8.664	.001
Mentoring	-8.438	6.096	-.279	-20.566	3.689	.017
Soc. Sci. Sem1	.350	.122	.368**	.108	.592	.075
Mentoring X Gender	6.972	5.832	.214	-4.629	18.574	.013
Mentoring X School	-.304	6.233	-.009	-12.703	12.095	.000
Mentoring X Soc. Sci. Sem1	.209	.188	.143	-.164	.582	.011

Note. Adjusted $R^2 = .197$ $F(4, 76) = 6.134$ for Step 1, $p < .001$. Step 2 $\Delta R^2 = .023$, $F(7, 73) = 1.189$, $p = .483$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

a statistically significant impact on the dependent variable (in this case, discipline referrals.)

To examine potential moderation of the mentoring program's effects on Time 3 discipline referrals by gender, school, or previous discipline referrals, product terms (Mentoring X School, Mentoring X Gender, Mentoring X T1 Discipline) were added in the second step of the model to identify interaction effects. Addition of these terms resulted in a statistically significant increment in R^2 ($\Delta R^2 = .132$, $F(7, 73) = 20.006$, $p < .001$). By including these additional variables, an additional 13% of variability in third semester discipline referrals was explained. For this step of the regression model, the adjusted $R^2 = .592$, indicating that together these variables explain more than 59% of the variability in third semester discipline referrals.

In regard to coefficients for individual variables, three of the seven variables in Step 2 of the model were statistically significant predictors of Discipline referrals at Time 3. Similar to the model in step 1, male gender predicted higher discipline referrals at time 3 ($\beta = .225$, $p = .031$, 95% CI .087 to 1.861, $sr^2 = .021$) and previous discipline referrals were also a statistically significant predictor ($\beta = 1.074$, $p < .001$, 95% CI .432 to .816, $sr^2 = .189$). The product term Mentoring x Discipline was also a statistically significant predictor of discipline referrals at T3 ($\beta = -.709$, $p < .001$, 95% CI -.715 to -.263, $sr^2 = .085$), indicating a significant interaction between number of discipline referrals in the first semester and mentoring program participation, in the prediction of third semester discipline referrals, and accounting for 8.5% of the variance in that dependent variable.

In order to further explore and delineate the moderating impact of first semester discipline referrals on mentoring program participation as a predictor of third semester

discipline referrals, the sample was stratified into two groups by median split according to number of discipline referrals at T1. Four groups were formed: 1) control participants with low discipline referrals at T1 (ctrl-low) 2) control participants with high discipline referrals at T1 (ctrl-high) 3) Mentored participants with low discipline referrals at T1 (men-low) and 4) mentored participants with high discipline referrals at T1 (men-high). Means and standard deviations for number of discipline referrals for each of these groups, at T1 and T3 are displayed in Table 8.

These data are also represented graphically in Figure 2. As can be seen in that graph, at T1, the sample groupings fall into essentially three clusters in terms of mean number of discipline referrals. The mean was .44 for both men-lo ($SD=.502$) and ctrl-lo ($SD=.506$) groups. The ctrl-hi group received an average of 4.30 ($SD=3.267$) discipline referrals in the first semester, and the men-hi group had the highest mean number of discipline referrals in the first semester at 6.96 ($SD=4.211$).

When looking at third semester discipline referrals, however, there are only two clusters. The men-lo and ctrl-lo groups are again similar, with .82 ($SD=1.696$) and .73 ($SD=1.077$) as their mean number of discipline referrals, respectively. The men-hi group ($M=2.80$, $SD=2.178$) and ctrl-hi group ($M=3.14$, $SD=2.575$) mean discipline referrals are also now similar. The difference in the slopes of the lines for men-hi and ctrl-hi groups is visually apparent, as these lines cross each other. On the whole, these data suggest the mentoring program exerts more influence on the third semester discipline referrals of those who had high discipline referrals as compared to low discipline referrals in the first semester.

Table 8

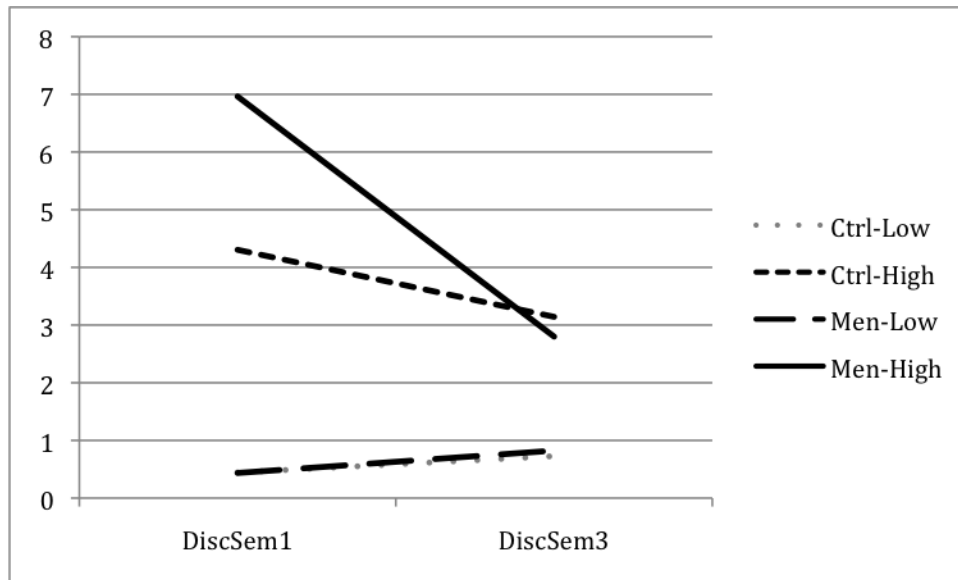
Discipline Referrals by Condition Assignment and Stratified by Number of Referrals

Group	Discipline Semester 1		Discipline Semester 3	
	Mean	Std Dev	Mean	Std Dev
Ctrl-Low	0.44	0.506	0.73	1.077
Ctrl-High	4.30	3.267	3.14	2.575
Men-Low	0.44	0.502	0.82	1.696
Men-High	6.96	4.211	2.80	2.178

Note. Ctrl-Low = control group participants with Semester 1 discipline referrals below the average; Ctrl-High = control group participants with Semester 1 discipline referrals above the average; Men-Low = Mentored participants with Semester 1 discipline referrals below the average; Men-High = Mentored participants with Semester 1 discipline referrals above the average..

Figure 2

Change in Discipline Referrals from Semester 1 to Semester 3, for Participants Grouped by Study Group and Initial level of Discipline Referrals



Mediation Step 2 – Impact of Independent Variable on Proposed/Putative Mediators

In the second step of the test of mediation, hypothesized mediators are regressed onto the independent variable. In the proposed mediation model, mentoring is the independent variable, and six cognitive measures are identified as potential mediators (Academic Motivation, Psychological Sense of School Membership, Academic Self Efficacy, Help Seeking, Classmate Acceptance, and Social Skill). Thus 6 separate regression analyses were conducted, with change in each of the cognitive measures from Time 1 to Time 2 as the dependent variable, regressed onto the independent variables of mentoring study group, gender, and school. Results of these regression analyses are summarized in Table 9.

No statistically significant result was found in any of the regression analyses with change in cognitive measures as dependent variables. R^2 values for these analyses ranged from 0 for change in Social Skill to .05 for change in Academic Self-Efficacy, and none of the independent variables was identified as statistically significant predictors at the $p < .05$ level. Based on these results, the proposed mediation model failed to meet the requirement that the independent variable must have a statistically significant effect on the mediator, as described in Step 2 of Baron and Kenny's (1986) test of mediation. These results provided no evidence of mediation by these cognitive measures, and therefore, no further step in the mediation test is presented here.

Table 9

Summary of Regression Analyses for Variables Predicting Cognitive Change

	Δ AcaMot		Δ PSSM		Δ ASE		Δ HSeek		Δ ClassAcc		Δ SocSkil	
	R ²	β	R ²	β	R ²	β	R ²	β	R ²	β	R ²	β
Step 1	.04		.02		.05		.02		.04		.00	
Gender		.07		-.01		.10		-.02		-.08		-.02
School		-.17		-.10		.16		-.00		.14		.05
Mentored		-.09		.06		.19		.12		-.06		-.01

Note. Δ AcaMot = Change in Academic Motivation from Time 1 to Time 2, Δ PSSM = Change in Psychological Sense of School Membership from Time 1 to Time 2, Δ ASE = Change in Academic Self-Efficacy from Time 1 to Time 2, Δ HSeek = Change in Help Seeking from Time 1 to Time 2, Δ ClassAcc = Change in Classmate Acceptance from Time 1 to Time 2, Δ SocSkil = Change in Social Skill from Time 1 to Time 2.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

Over the last several years, research on mentoring interventions, including school-based mentoring (SBM), has established the efficacy of mentoring programs in improving cognitive and behavioral factors associated with school engagement and achievement (Dubois et al., 2002; Grossman & Rhodes, 2002; Rhodes & Dubois, 2008). However, much less is known about how mentoring achieves these effects. Some theoretical models of school engagement posit that behavioral outcomes are influenced by cognitive changes that precede them (Connell et al., 1995; Klem & Connell, 2004), and there are some empirical data to support these hypothesized relationships (Brewster & Bowen, 2004; Caraway et al., 2003; Carroll et al., 2008).

The current study examined the impact of an SBM intervention on cognitive and behavioral outcomes in three, joined, randomly controlled trial samples of urban, low income, academically at risk, ethnic minority youth. Previous studies found this SBM intervention to have a statistically significant impact on behavioral outcomes, including grades and negative school behavior, as well as cognitive measures, such as decision making and perception of teacher support. One aim of this study was to replicate the finding of significant impact in a larger, aggregate sample. In keeping with the ongoing focus in the research literature regarding randomized controlled trials and the examination of processes of therapeutic change (Kraemer, Wilson, Fairburn, & Agras, 2002; Murphy, Cooper, Hollon, & Fairburn, 2009), the study sought to assess not only the efficacy of the SBM intervention, but also the viability of an explanatory, conceptual model, and thus identify mechanisms of change. Connell's Self System Processes model, in which cognitions regarding perceptions of relatedness, competence and autonomy are

theorized to influence subsequent school behaviors and outcomes, was tested using mediation analyses.

Program Effects on Behavioral Outcomes

Results indicating a significant effect of the intervention on discipline referrals in the subsequent semester/school year partially replicate previous findings and provide some support for our first hypothesis. Both Holt et al. (2008) and Clarke (2009) found a statistically significant effect of this intervention on discipline referrals. Given the larger sample size in the current study, hierarchical regression could be used to examine the role of moderators on the impact of the intervention. Mentored students with higher levels of discipline referrals in the past showed the greatest decline in discipline referrals. The results suggest the intervention's impact on discipline referrals was predominantly in this group, and the final regression model, including the interaction between mentoring and previous discipline referrals, explained almost 60% of the variance in discipline referrals in the third semester of the study, which is a large effect size. These data lend some empirical support to the practice of targeting mentoring services to those youth most at risk, as indicated by previous school behavior. Thus results of previous studies demonstrating a significant positive impact of this SBM intervention on negative school behavior were replicated, and extended to include evidence of moderation by previous level of negative school behavior.

In contrast to the findings of Clarke (2009), however, the current study did not find the intervention to have a significant impact on grades in Math, Social Science, or Language Arts. It should be noted, however, that the improvements in Math and Language Arts grades in that previous study were found for students in the fourth

semester of the study, a time point not available in the current dataset. Thus students in this study would need to be followed for an additional semester, in order to replicate the findings of Clarke (2009).

Program Effects on Cognitive Outcomes

Empirical results in this sample do not provide support for this study's second hypothesis, regarding effects of the intervention on cognitive outcomes. Of the six cognitive measures examined in the study (psychological sense of school membership, academic motivation, academic self-efficacy, help seeking, perceived social skill, and classmate acceptance), none was impacted by the mentoring intervention to a statistically significant degree. This is in contrast to the findings of other mentoring intervention studies (Grossman & Rhodes, 2002; Herrera et al., 2007; Portwood et al., 2005) that found significant intervention effects on cognitive measures.

Both previous studies of this SBM intervention (Clarke, 2009; Holt et al., 2008), found a significant impact on perceptions of teacher support (as measured by select items from the PSSM). Reliability of these items was deemed too low ($\alpha = .54$) for analysis in the current study, and thus those results could not be replicated. The current results are also in contrast to a number of studies examining mentoring interventions (Converse, 2009; Karcher, 2005, 2008; Portwood et al., 2005) that found a significant impact on school connectedness and/or ratings of teacher support. Some of these studies (Converse, 2009; Karcher, 2008) were also conducted in ethnically diverse samples, although they differ from the current study in other respects, including ages/grades represented in their samples and program duration and other aspects of the mentoring intervention.

A number of possible measurement problems could potentially have impacted the results regarding cognitive variables. Program adherence was not 100% and the range of implementation success may have influenced results. High levels at pretest for some cognitive variables may have led to a ceiling effect. Given time constraints for survey administration, a number of the scale versions were modified, utilizing a reduced number of items, which may have affected scale validity.

Mediation and the Relationship of Cognitive and Behavioral Variables

For quite some time, cognitive variables, such as academic self-efficacy, sense of school belonging, decision-making, and academic motivation, have been considered important factors in school engagement and achievement among youth (Zimmerman et al., 1992). Correlational and prospective research has shown that higher levels on measures of these cognitive variables are associated with higher levels of academic achievement and behavioral engagement (Caraway et al., 2003; Carroll et al., 2008; Guay & Vallerand, 1996). Contrary to the findings in those studies, no empirical support was found for the third hypotheses of this study, regarding the relationship between the cognitive variables measured and behavioral outcomes. None of the cognitive measures examined in the current study were found to be significantly correlated with or predictive of any behavioral outcome measure at any time point. Even in regard to attrition from the study (a considerable proportion of which is likely due to the student leaving the school system, perhaps as a result of dropping out) no difference was found in cognitive variables, whereas those who were lost to follow up in the study had significantly lower grades in Math and Social Science, and nearly twice the number of discipline referrals at pretest, compared to those who remained in the study.

Perceived relatedness to school, in particular, has been found to be predictive of academic outcomes, including findings in samples of ethnic minority youth (Brewster & Bowen, 2004; Klem & Connell, 2004). In regard to PSSM, in a sample of largely white youth, Goodenow (1993) found students reporting a strong sense of school membership also reported higher academic motivation and achieved higher grades. Goodenow and Grady (1993) found a similar relationship between school belonging and academic motivation in a sample of urban, ethnically diverse students, but that study did not include data on grades. Urga (2003) found PSSM scores to be correlated with self reported grades in an ethnically diverse sample of 7th and 8th grade males, but that study utilized a cross sectional design. Results from the current study are somewhat consistent with these findings, in that PSSM was significantly correlated with measures of academic motivation, academic self-efficacy, and help seeking, but no significant relationship was found with grades from the official student records, or any other behavioral outcome measure, in this sample of black and Hispanic, urban youth.

While it is not appropriate to interpret null findings, the absence of a statistically significant relationship between the mentoring intervention and cognitive change does not provide support for a role for the cognitive variables assessed as mediators of the effects of this mentoring intervention. The current results are similar to those of Holt et al. (2008), who also found no relationship between cognitive and behavioral outcome variables in a study utilizing this SBM intervention. Thus it could be that this intervention works via other means than those examined in this study and/or other mentoring programs studied. For example, consistent findings of behavioral effects for this mentoring intervention have been in regard to negative school behavior and

discipline, and these behaviors could be less related to the cognitive mediators studied than others. In the future, researchers may need to search for other mediators. Results from some mentoring intervention studies (Blum & Jones, 1993; Holt et al., 2008; Larose, 2005) found mentor -mentee relationship variables to be significantly associated with behavioral outcomes, suggesting these may warrant further investigation as potential mediators of the behavioral impact of mentoring.

In addition, sample characteristic may play an important role. Results from a number of studies suggest grade, ethnic group, and other socioeconomic differences in the relationships between cognitive factors, such as sense of belonging, and performance related outcomes (Faircloth & Hamm, 2005; Furrer & Skinner, 2003; Hughes & Kwok 2007). The limited research that has examined these relationships in ethnic minority youth suggests the relationships may differ from those observed in majority/white youth. Methodological issues may also have affected results. The cognitive variables were all assessed by self-reports completed during administrations in groups during school class time, in contrast to the behavioral measures, which were drawn from official school records. The timing of the collection of this self-report data, both in terms of the academic calendar and receipt of the intervention, may have influenced results. In regard to tests of mediation, although Baron and Kenny's (1986) causal steps method is by far the most commonly utilized technique in the literature, it may be less well suited for situations of partial mediation, or in which effect sizes of relationships involving the putative mediator are small. Fritz and MacKinnon (2007) calculate that in these situations, a sample size larger than the one in the current study, or a different statistical technique, may be required to achieve sufficient statistical power.

This study sought to examine the role of theoretically meaningful mediators of intervention outcomes — a step toward an empirical basis for stating how mentoring intervention works. Specifying the processes of change is important not merely for theoretical reasons, but also so that mentoring interventions can be made more effective for the greatest number of youth in diverse settings and circumstances. Identifying the critical processes and components of mentoring may allow existing interventions to be modified in a manner that enhances their utility and allows them to be targeted toward specific needs and populations.

Conclusion/Summary

The 5-month mentoring intervention had a significant impact on negative school behaviors at follow up, as measured by discipline referrals, among academically at risk high school youth. This effect was moderated by previous number of discipline referrals, with mentored students with a higher number of discipline referrals prior to the intervention showing the most marked decline. Effects of the Achievement Mentoring Program were evident when measuring outcomes for the semester after the intervention was administered, suggesting sustainability/durability of treatment effects. However, no statistically significant impact on cognitive measures was found, and no statistically significant mediators of intervention effects were identified among the cognitive variables examined to explain how mentoring reduced negative school behaviors.

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CIRRICULUM VITA

ANDREA LYNNE TAYLOR

EDUCATION

- Ph.D.** **Rutgers, The State University of New Jersey**
Clinical Psychology
- M.S.** **Rutgers, The State University of New Jersey**
Psychology, 2007
Thesis: Effects of perceived ethnic discrimination on hostility and optimism-pessimism
- M.A.** **New York University**
Journalism and Communications, Science Health and Environmental Reporting Program,
1991
- A.B.** **Stanford University**
Human Biology, 1988

PROFESSIONAL EXPERIENCE

- St. Louis Veterans Affairs Medical Center**, Psychology Intern, 2009 - 2010
- Anxiety Research Lab**, Rutgers University, Research Clinician, 2005 – 2009
- Psychology Department**, Rutgers University, Instructor 2006-2009
- Rehabilitation & Physical Medicine**, Mt. Sinai Hospital, Psychology Extern, 2007-2008
- Behavioral Cardiovascular Health Center**, Columbia University Medical Center,
Clinical Research Interviewer, 2007 - 2008
- The Psychological Clinic**, Rutgers University, Student Therapist, 2005 – 2007
- Cognitive Neuroscience Lab**, Columbia University, Research Assistant, 2003 – 2004