UNDERSTANDING THE RELATIONS AMONG SCHOOL MISBEHAVIOR,

ACADEMIC SUCCESS, SCHOOL BONDING, AND ALCOHOL USE

Dissertation Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree

Doctor of Philosophy

by

John Travis Spoede, Jr.

May 2014

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A Dissertation for the Degree
Doctor of Philosophy

by

John Travis Spoede, Jr.

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May 2014

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Abstract

Existing research has shown that alcohol use, school misbehavior, school
bonding, and academic performance are related to each other in numerous, complex
ways. However, few studies used data from a nationally representative sample,
considered mediating mechanisms, or accounted for measurement error during
examinations of the relations among these constructs. This study used data from the 2008
Monitoring the Future study, a representative national sample of 3,389 10th Graders in the
U.S. Drawing on social development model theory (e.g., Hawkins, 1985); a mediated
structural equation model was developed and tested. Specifically, it was hypothesized
that the association of academic achievement with school misbehavior and alcohol use
will be (partially or fully) mediated by school bonding. Both model variants were tested
controlling for mother's education level, youth gender, and youth race/ethnicity. The
findings of this study suggest that school bonding significantly mediates the relations of
academic achievement to school misbehavior and alcohol use. Based on these findings,
when developing programs to decrease at-risk behaviors and school misbehavior,
educators should not only consider academic interventions, but should also develop a
culture in school which allows students to develop positive attitudes and interactions in
an educational setting.

Table of Contents

List of Tables

List of Figures

Chapter I

Introduction

Past research has shown that adolescent risk factors and developmental processes have a significant impact on how a student transitions into adulthood and the developmental trajectory a student takes once in adulthood (Chassin, Flora & King, 2004; Newcomb & Bentler, 1988). Empirical work based on the very influential Social Development Model (SDM) (e.g., Hawkins, 1985), which is a synthesis of control theory, social learning theory, and differential association theory (Catalano et al., 1996), has identified school misbehavior, academic achievement, school bonding, and alcohol use as important, interrelated domains during adolescence (e.g. Fleming et al., 2008; Hawkins, 1997; Steenbergen-Hu & Moon, 2011). Moreover, these factors influence pathways from adolescence into adulthood, and thus are important variables to consider (Andreasson, Allebeck, Brandt & Romelsjo, 1992; Chassin, Flora & King, 2004).

Existing research has shown that alcohol use, school misbehavior, school bonding, and academic performance are related. Specifically, lower levels of alcohol use are related to increased academic achievement; higher levels of school bonding are related to decreased school misbehavior; and lower levels of school misbehaviors are related to higher levels of academic achievement (Chatterji, 2006; Crosnoe, 2006; Jeynes, 2002; Peled-Oren et al., 2009; Renna, 2007; Schulenberg, Bachman, O'Mally & Johnson, 1994; Townsend, et al., 2007). However, our understanding of the manifold relationships between these four domains during the period of adolescence is still limited in several ways. First, many studies on these interrelations have relied on statistical techniques that do not account for measurement error (Chatterji, 2006; Crosnoe, 2006; Jeynes, 2002;

Peled-Oren, et al., 2009; Renna, 2007; Townsend, et al., 2007). Thus, the magnitude of

relationships among these constructs may have been over-estimated. Second, few studies

have examined interrelations among all four domains. Many of them focused on just two

or three of these domains (Chatterji, 2006; Crosnoe, 2006; Jeynes, 2002; Peled-Oren, et

al., 2009; Renna, 2007; Schulenberg, Bachman, O'Mally & Johnson, 1994; Townsend, et

al., 2007), limiting our understanding of the interrelationships among all four domains.

Third, much extant research has relied on cross-sectional correlational designs (Ludden &

Eccles, 2007; Hallfors, Cho, Brodish, Flewelling & Khatapoush, 2006). Thus, the

directionality of associations is not well understood, and this has likely contributed to

many contradictory study findings. Fourth, mediating mechanisms have rarely been

tested in existing empirical studies (Gill, Sukhdeep & Reynolds, 1999; Hill & Craft,

2003; Rudasill, et al., 2010; Zullig, Young & Hussain, 2010). Thus, our understanding of

the exact processes through which some of these constructs influence each other is

limited. Fifth, few studies have examined interrelationships among these four domains

using nationally representative samples. Rather, most studies have relied on convenience

samples, which limit the generalizability of study findings beyond the participants that

were sampled (Ludden & Eccles, 2007; Hallfors, Cho, Brodish, Flewelling, &

Khatapoush, 2006). In conclusion, further research on the complex pattern of

interrelations between alcohol use, school misbehavior, school bonding, and academic

performance is needed.

The current study was designed to address some of these gaps by examining the

mediating associations between all four domains. Specifically, it examined for a

nationally representative sample whether a students' sense of school belonging, or school

bonding, is a mediator of the relations of the student's academic performance with the students' alcohol use and misbehavior. Guided by social development theory (Hawkins, 1985), the described mediating associations among the four domains were evaluated simultaneously using latent variable analysis, thereby taking measurement error into account. Specifically, mediated pathways and associations among the four constructs were examined among 10th grade students from the 2008 Monitoring the Future (MTF) survey (Johnston et al., 2008).

Findings from this research have important implications for educators and other applied professionals because a better understanding of the complex associations among these four domains will increase the likelihood that strategically placed interventions in one of these domains will positively influence other interrelated domains (Bryant, et al., 2003). A better understanding of the complex relations and mediating associations among these constructs during the adolescent years will allow practitioners to make appropriate determinations in identifying at risk youth and creating interventions for them to achieve a positive conclusion in adolescence and thereby assist the students with successful transitions into adulthood. Specifically, considering the importance of academic achievement, as its effects are mediated through school bonding, created an added layer of complexity which should allow educators to develop more potent interventions which will lead to positive outcomes for their students.

This dissertation consists of five chapters. Chapter one presents the problem under investigation, and concludes with a brief definition of terms that are used throughout the remainder of the dissertation. Chapter two provides a review of relevant literature related to adolescence in the areas of: sense of school belonging (school

bonding), alcohol use, academic performance, and school misbehavior. Individual differences among students, including issues of gender and race/ethnicity, are also considered in this review of the literature. Chapter two also presents the hypotheses that were tested.

Chapter three contains an overview of the methods used to investigate the hypotheses. It begins by presenting a thorough description of the sample, followed by descriptions of the materials used to gather participants' responses and the procedure utilized for data collection. Chapter four presents the results of the statistical analysis in both text and tabular formats. Finally, chapter five reviews and discusses the main findings of the overall research study, limitations of the current study and will also consider educational implications based on the reported results.

Problem Statement

As individuals pass through adolescence, they traverse many challenges, including those related to school and substance use (Lynne-Landsman, Graber, Nichols & Botvin, 2011). Adolescence has been studied as a developmental stage during which choices and decisions influence later adult outcomes and pathways (Brook et al., 2011). These choices have an effect on a person's future functioning in society, and they also serve as an indicator for potential future success (Henry, Knight & Thornberry, 2012). Further, existing research demonstrates that adolescent substance use is related to various negative school behaviors (Hallfors, et al., 2006; Hawkins, Catalano & Miller, 1992). Research has also explored the associations among negative school behaviors and substance use from different directions. Specifically, Hallfors et al. (2006) and Schulenberg et al. (1994) examined negative school behaviors as predictors of increased

likelihood for substance use. Focusing on the opposite direction, Paulson, Coombs & Richardson (1990) investigated whether adolescent substance use is a risk factor for negative school behaviors.

However, among current research there is still a need to explore all of these factors as they relate to each other. Specifically, the manifold interrelations between alcohol use, school misbehavior, school bonding, and academic performance need to be explored in more depth. More research is needed that examines associations prospectively and in both directions to help get a more complete understanding of the complex relationships among those domains. A focus on mediating mechanisms is especially warranted. The mediation model tested in this study adds to the current understanding of these variables because it highlights unique information about the relationship among these variables.

In order to examine the relationship between school factors and health risks (e.g. alcohol use), the present study used a portion of the 2008 MTF national data collected from students in 10th grade (Johnston et al., 2008). The MTF has been collecting data from adolescents for over 29 years, and has developed a reputation as a data set worthy of use in various research settings and research studies. More specifically, the MTF provides data on alcohol use, school misbehavior, school bonding and academic performance in early and mid-adolescence. Using these data, the findings from the present study will allow practitioners and policy makers to understand better the complex relations and mediating influences among several constructs that have been explored in isolation in much prior research. Additionally, it will allow practitioners to make appropriate determinations in identifying at-risk youth and working with them to navigate the

transition from adolescence to adulthood successfully. The promise of this study stems from using a nationally representative sample to examine these factors simultaneously, which has the potential to yield more informative results than studying these variables in isolation. Additionally, considering the importance of academic achievement, as its effects are mediated through school bonding, created an added layer of complexity which should allow educators to develop more potent interventions which will lead to positive outcomes for their students.

Definition of Terms

In this study, the associations among school bonding, alcohol use, academic achievement, and school misbehavior were specified guided by Social Development Model Theory, SDM (Hawkins & Weis, 1985). The SDM framework focuses on the association of multiple risk and protective factors with prosocial and/or delinquent behaviors in childhood and adolescence. According to SDM, students tend to adopt beliefs and behaviors from groups with which they are most closely bonded. In SDM, prosocial factors such as academic success, positive school bonding and minimal school misbehavior in childhood and adolescence are domains of key interest. Moreover, SDM theory addresses the effects of antisocial behaviors, such as increased school misbehavior and alcohol use, on subsequent academic success and school bonding.

SDM emphasizes positive student bonding as an indicator of prosocial and healthy behaviors. The more bonded a student is with his/her school, the less likely the student is to demonstrate at risk behaviors, such as underage drinking and school misbehavior. Conversely, if the student has a low sense of school bonding, SDM would

postulate that the student is at increased risk for harmful behaviors like underage drinking and school misbehavior.

The four constructs of interest in the present study (academic achievement, school bonding, school misbehavior, and alcohol use) are operationalized as follows.

Academic achievement. Common indicators of academic achievement include test scores, overall grade point averages, GPA's (either self-reported or verified through report cards or transcripts), and teacher-made assessments (e.g. Cokley et al., 2012; Johnson et al., 2004). In the present study, academic achievement was operationalized as the youths' self-report of their grade point average during the current school year. Self-reported grades tend to correlate very highly with school-reported grades (e.g., Crockett, Schulenberg & Petersen, 1987).

School bonding. There are many different approaches to conceptualizing school bonding (e.g. Bryan et al., 2012; Howard & Ziomek-Daigle, 2009; Oelsner et al., 2011). Although there is little consensus in the literature regarding the measurement of school bonding, our indicator of youths' attachment and bonding to school was based on liking school, disliking school and interest in schoolwork, similar to prior research guided by the SDM framework (Battistich, Schaps & Wilson, 2004; Catalano & Hawkins, 1996; Hawkins et al., 1997; Maddox & Prinz, 2003).

School misbehavior. School misbehavior can be measured through a variety of indicators, such as major school infractions resulting in an office visit, truancy, or discipline measures (such as afterschool detention, in school suspension, and out of school suspension) (Durmuscelebi, 2010; Finn, Fish & Scott, 2008; Fleming et al., 2008). Similar to prior SDM research (Johnson et al., 2004), this study assessed school

misbehavior through the following indicators: frequency of truancy, suspensions, and misbehavior.

   Alcohol use. Several different methods are available to assess alcohol use, including drug testing (breathalyzers, blood tests, or urinalysis), self-report measures (survey items which capture information about frequency, intensity, and attitudes towards alcohol use), or other indicators such as peer perceptions and familial perceptions (Johnson et al., 2004; Williams & Nowatzki, 2005). The current study focused on the self-reported initiation of alcohol use.

Chapter II

Review of Related Literature

The purpose of the present study was to extend research on the associations among academic success, alcohol use, school bonding and school misbehavior for 10th graders using the MTF data. Specifically, this study tested whether school bonding partially or fully mediated the associations of academic achievement with school misbehavior and alcohol use via structural equation modeling (SEM) analyses (Kline, 2011). SEM allows for the adjustment of associations for measurement error, and it allows for variables to be observed in a system of relationships without indicating causation or directionality of the effects (Kline, 2011). This brings added value to this study because in many forms of statistical analysis a hypothesis, generally based on a theoretical model, determines which variables are independent and dependent, but with SEM, the system and the dynamics of the relationships within the system can be explored without forcing variables into predetermined directional theoretical models. Further, when using SEM, the overall model can be tested simultaneously as opposed to only testing individual coefficients (Kline, 2011).

Specifically, two different models were tested. First, a fully saturated model (referred to as "partially mediated model") was tested, in which all structural coefficients were freely estimated. Second, a more parsimonious alternative model (referred to as "fully mediated model") was tested, which was developed based on prior research and SDM theory. Both models will be discussed in more detail at the end of this chapter, and they are shown in the figures on the following pages to facilitate the ease of understanding (see Figures 1 & 2). Subsequently, the extant literature on associations

among the four constructs will be summarized, with a particular emphasis on findings or

models that support the fully mediated theoretical model. The review in this chapter also

explains the basic concepts described.

Figure 1: Partially Mediated Model (with effects controlled for by mother's education
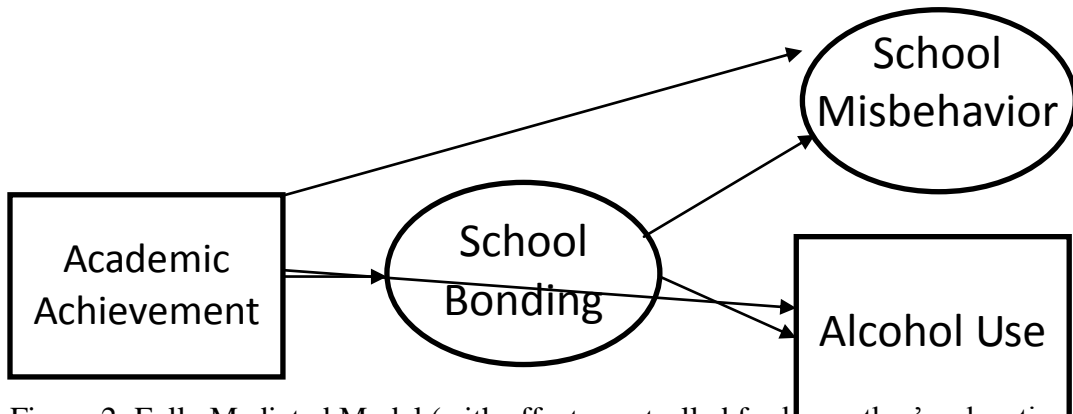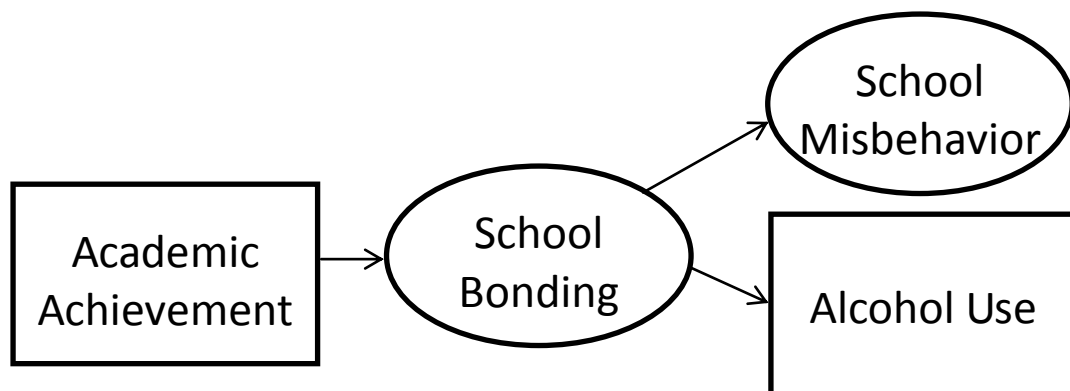
level, student gender and student race/ethnicity)

Figure 2: Fully Mediated Model (with effects controlled for by mother's education level,

student gender and student race/ethnicity)

Conceptual Framework

Social Development Model, SDM, (Hawkins & Weis, 1985) allows for these associations to be examined within a unifying framework. SDM asserts that factors related to socialization in various social contexts, such as schools, have an influence on delinquent behaviors, such as school misbehavior, academic achievement, and alcohol use. When a student has the opportunity to function positively and successfully within a social system such as a school, the student's prosocial behaviors are positively reinforced and each student has an opportunity to develop skills necessary to be successful within the system (Hawkins & Weis, 1985). These skills, in turn, allow the individual to increase attachment to prosocial others and the social bonds inhibit associations with students engaging in delinquent behaviors. The minimizing of these associations with deviant peers assists in preventing delinquent behaviors in the student. This theoretical framework is the construct this study uses to describe the direction of the relationships between the four variables and the various outcomes. It is helpful to review each of the four variables examined in this study and define them in terms of the SDM framework.

Academic Achievement

There are various findings which assist in the understanding of academic achievement in relation to negative school behaviors and substance use. In many research studies, low academic achievement is related to substance use. Specifically, Molidor, Nissen, and Watkins (2002) reviewed literature related to delinquent female substance users. They identified several adverse effects of adolescent substance use, including, lower motivation, decreased long range goals, and low academic achievement. Conversely, adolescents who demonstrate high academic achievement and report positive

attitudes towards education and school (e.g., report enjoying school) are at decreased risk of engaging in substance use behaviors as compared to age-mates who reported attitudes to the contrary (Brook, Whiteman, Gordon, & Cohen, 1986; Bryant & Zimmerman, 2002; Hawkins & Weis, 1985; Oelsner et al., 2011; Roeser, Eccles, & Freedman-Doan, 1999; Scheier & Botvin, 1998; Voelkl & Frone, 2000).

Similarly, early adolescents who participate in substance abuse behaviors are at increased risk of dropping out of high school prior to graduation (Lynskey & Hall, 2000; Jordan, Lara, & McPartland, 1996; Rumberger, 1987; Ekstrom, Goertz, Pollack, & Rock, 1986). Other research demonstrates a clear relationship between academic achievement, negative attitudes towards school, and dropping out of school (Bachman et al., 2008; Lynskey & Hall, 2000; Townsend, Flisher, & King, 2007). There are significant costs associated with dropping out prior to graduation for both the individual and society. To this end, salary earnings for students who drop out of high school prior to graduation are consistently lower than for those students who graduate from high school (Bureau of Labor and Statistics, 2011). Students who drop out of high school are more likely to access public assistance programs such as food stamps and welfare, and 82% of incarcerated prisoners did not graduate from high school (Ysseldyke, Algozzine, & Thurlow, 1992). High school graduates who report having early onset of substance-using behaviors were at increased risk for not matriculating in college or not graduating from college (Barber, Eccles, & Stone, 2001; Arata, Stafford, & Tims, 2003).

There was a strong relationship between academic achievement and other school variables and adolescent substance use (Bryant, Schulenberg, Bachman, O'Malley, & Johnson, 2000; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995). Generally,

adolescents who had adverse school experiences, such as academic underachievement, were at increased risk for substance-using behaviors compared to their counterparts who had positive school experiences, as indexed by academic success (Bachman, Johnston, & O'Malley, 1981; Bryant et al., 2000; Bryant & Zimmerman, 2002; Diem, McKay, & Jamieson, 1994; Hawkins, Catalano, & Miller, 1992; Larson, 2000; Petraitis, Flay, & Miller, 1995). Focusing on the opposite direction, Jessor (1976) and Robins (1980) found in their research studies that academic failure was a strong predictor of substance use. Luthar and Ansary (2005) concluded that directional relationships are unclear between academic underachievement and substance use in adolescents. The research, in general, also strongly supports the relationship between these two variables, even when accounting for various other factors such as parental support and socioeconomic status (SES) (e.g. Johnson et al., 2004)

In a study examining the effects of adolescent drinking and academic failures on each other, Crosnoe (2006) concluded that academic failure had the greatest impact on student health and success. Further, adolescent drinking, while related to other risky behaviors, was less strongly related to later failing grades. Therefore, Crosnoe (2006) concluded that academically focused interventions had a greater potential to affect adolescent development and had the most encompassing effects on preventing risk-taking behaviors. Summarizing, the extant literature provides stronger support for the effect of academic achievement on adolescent alcohol use relative to the effect of adolescent alcohol use on academic achievement, once bidirectional associations among the four construct domains are simultaneously examined.

Alcohol Use

Alcohol use during adolescence has been examined adopting various theoretical frameworks. One study, by Windle (1990) reported that within a group of high school students, learning problems were related to alcohol use problems. More recently, Patrick and Schulenburg (2010) found that approximately one in five 10th graders had engaged in heavy episodic drinking in the past two weeks, based on a self-report survey. Patrick and Schulenberg (2010) also concluded that episodic drinking behaviors were prevalent among the nation's youth, related to various risk factors, and highlighted the importance of further screening and prevention efforts. There have also been several studies which revealed a relationship between adolescent alcohol use and school problems (Peleg-Oren et al., 2009; Schulenberg et al., 1994; Brook et al., 1989; Galambos and Silbereisen 1987).

Generally, research studies have concluded that there is an association between drinking in adolescence and poor academic success (Crum et al., 2006; King et al., 2006; Godley, 2006; Diego et al., 2003; Jeynes, 2002; Costa et al., 1999). Adolescents who used alcohol demonstrated decreased educational attainment and decreased incidence rates of completing school (Cook & Moore, 1993; Ellickson, Tucker, & Klein, 2003; Gil-Lacruz & Molina, 2007; Koch & McGeary, 2005; McCluskey, Krohn, Lizotte, & Rodriguez, 2002; Renna, 2007). However, findings have not always been consistent. Other research studies concluded that alcohol use in adolescence had minimal or statistically insignificant influence on educational success and graduation attainment (Chatterji, 2006; Dee & Evans, 2003; Koch & Ribar, 2001). Abdelrahman, Rodriguez, and Ryan (1998) conducted research with 2,849 7th and 8th grade students. They concluded that students who engaged in and self- reported substance use were at

significant risk for lower grades as compared to students who had not reported substance use. This study reported that students who received grades of D or F were four times more likely to use alcohol, six times more likely to smoke cigarettes, and eight times more likely to abuse drugs as compared to students who earned grades of A or B. In this study, Abdelrahman et al. (1998) based their research on a presumed causal relationship between substance use and lower academic performance.

On the other hand, Jessor (1976) and Robins (1980) conducted research supporting academic failure as a strong predictor of substance use. Likewise findings from Luthar and Ansary (2005), even though directional relationships remained unclear between substance use and academic underachievement, strongly supported a relationship between these two variables even when accounting for various other factors, such as parental support and socioeconomic status (SES). Through the use of structural equation modeling, directional relationships between these variables can be investigated in a more comprehensive model.

In addition to exploring the relationships between substance use and school indicators, research has found that early adolescents who exhibited substance-using behaviors had an increased likelihood for experiencing negative consequences, such as health problems, social-emotional problems, and decreased social competence (Molidor, Nissen, & Watkins, 2002). Similar research found that substance use and substance abuse in early adolescents were also a predictor for adult substance abuse behaviors (Chassin, Flora, & King, 2004; Miller et al., 2000; Newcomb & Bentler, 1988). When exploring the initial onset of alcohol use, research has shown that adolescents who initiated alcohol use prior to fifteen years old were at greatly increased risk of developing alcoholism as adults

(DeWit, Adlaf, Offord, & Ogborne, 2000; Andreasson, Allebeck, Brandt, & Romelsjo, 1992; Boyle, Offord, Racine, Szatmari, Fleming, & Links, 1992; Kandel, Davies, Karus, & Yamaguchi, 1986; Kaplan, Martin, Johnson, & Robbins, 1986; Mills & Noyes, 1984; Yamaguchi & Kandel, 1984). In conclusion, directional research studies suggest that adolescent alcohol use has an effect on other factors and is positively related to other negative outcomes, such as low academic achievement, health problems and school problems.

School Bonding

There is little consensus in the literature regarding the measurement of school bonding. In this study, the indicator of youths' attachment and bonding to school was based on liking or disliking school and being interested in schoolwork (Hawkins et al., 1997; Hirschi, 1969). These indicators capture adolescents' reports about their feelings towards school environment, school work, school personnel, and the overall educational processes they encounter at school. Hirschi (1969) developed a model for explaining the relationship between problem behaviors and an individual's bond with institutions and society. Building on this theory, Agnew (1993) purports that there is a decrease in substance use by youth who are bonded with positive societal links (such as school bonding). The social development model (Catalano & Hawkins, 1996) endeavors to explain both positive and problem behaviors as an expression of learned behavior based on a person's involvement with others. For example, a student with positive involvement in a school setting would have the opportunity to experience and develop appropriate behaviors and would have positive behaviors reinforced through school bonding. On the

other hand, a student may have the chance to engage in problem behaviors and have these behaviors reinforced by peers if he/she experienced negative school bonding experiences.

It is important to note that there is significant empirical evidence demonstrating that school bonding and commitment to secondary education are significant protective factors in decreasing the risk of drug use (Bryant, Schulenberg, O'Malley et al., 2003; McNeely et al., 2002). Crosnoe, Erickson, & Dornbusch (2002), found that increased connectedness to school was associated with decreased school misbehavior and alcohol use among high school students. In conclusion, based on SDM, school bonding has a strong influence on behaviors such as school misbehavior and alcohol use. Overall, school bonding can be a mediating factor, which may influence how factors such as academic success can affect school misbehavior and alcohol use.

School Misbehavior

Najaka, Gottfredson, and Wilson (2001) completed a meta-analysis of both experimental and quasi-experimental studies of school based prevention interventions and concluded that positive changes in commitment and connectedness to school were accompanied by decreases in problem behaviors. Oelsner, Lippold, and Greenberg (2011) found in a research study (N=2,902) that increased delinquent behaviors at school and decreased academic achievement were related to decreased school bonding, based on hierarchical growth curve modeling analysis.

Bryant et al. (2003) found that school misbehavior was positively associated to substance use at age 14, while school bonding was negatively associated with school misbehavior (Chapman et al., 2011; Zimmerman 2002). Students who participate in delinquent behaviors are at increased risk of committing more than one act of

delinquency (Landsheer & Van Dijkum, 2005). For example, a student who has truancy issues is at increased risk for other delinquent behaviors, such as substance abuse or vandalism. Further, students who demonstrate delinquent behaviors are at increased risk for emergent problem behaviors related to school (Choi, Harachi, Gilmore & Catalano, 2005). In conclusion, the extant literature offers support for the effect of school misbehavior as an indicator for other social misbehaviors and academic under achievement; however, it appears that increased school connectedness may help decrease school misbehavior.

Overall, the review of the extant literature on the four constructs of interest in the current study has revealed a number of limitations and gaps. Although there is evidence based on empirical data and theoretical models that these four variables are related (Bryant, 2000), much of the empirical literature, to this juncture, has focused on examining directional relationships among just subsets of these variables. The current study tested a more comprehensive model of the manifold linear associations among all four variable domains (i.e., school misbehavior, academic achievement, school bonding, and alcohol use) using SEM, which allows for examining the relationships among the variables while accounting for measurement error. Additionally, the current study tested a mediator model, supported by SDM theory, whereby academic achievement effects on school misbehavior and alcohol use were mediated by school bonding.

It is important to note that few of the studies reviewed have applied advanced statistical analyses or considered mediating factors. Specifically, these studies have not used statistical analysis which accounts for measurement error (Chatterji, 2006; Crosnoe, 2006; Jeynes, 2002; Peled-Oren, et al., 2009; Renna, 2007; & Townsend, Fisher, King,

2007). Without providing information about measurement error, the magnitude of

relationships among these variables may be inflated. In general, these studies did not

examine interrelations among the four domains, which will be explored in this study.

There are some studies which examined two or three of these domains (Chatterji, 2006;

Crosnoe, 2006; Jeynes, 2002; Peled-Oren, et al., 2009; Renna, 2007; Schulenberg,

Bachman, O'Mally & Johnson, 1994; & Townsend, Fisher, King, 2007). This is

important to note, because with limited examination of these domains in a single system

of relationships, there is limited understanding of the interrelationships among all

domains. Additionally, the reviewed literature relied heavily on cross-sectional

correlational designs (Ludden & Eccles, 2007; Hallfors, Cho, Brodish, Flewelling, &

Khatapoush, 2006). Thus, the directionality of associations is not well understood, and

this has likely contributed to many contradictory study findings. Moreover, research has

been conducted using limited samples (such as convenience sampling), and the research

to be completed within this study will broaden understanding by examining

interrelationships among these four domains with the use of a nationally representative

sample (Ludden & Eccles, 2007; Hallfors, Cho, Brodish, Flewelling, & Khatapoush,

2006). In conclusion, further research on the complex pattern of interrelations between

alcohol use, school misbehavior, school bonding, and academic performance is needed.

Research Questions and Hypotheses

        The purpose of the present study was to examine the effect academic achievement

has on school misbehavior and alcohol use while considering the mediating influence of

school bonding on the relationship. The research was conducted through the use of a

nationally representative sample of 10th graders. As indicated above, two competing

model specifications were tested. As a baseline model, a fully saturated model was tested first (see FIGURE 1) in which all structural parameters were freely estimated. Specifically, this model posited that school bonding partially mediated the effects of academic achievement on school misbehavior and alcohol use. Next, the more parsimonious fully mediated model displayed in FIGURE 2 was tested which was developed based on existing research (Crosnoe, Erickson, & Dornbusch, 2002). As can be seen in FIGURE 2, it was hypothesized that the effect of academic achievement on school misbehavior and alcohol use was fully mediated by school bonding. There were several variables which were used as control variables (mother's education level, youth gender, and youth race/ethnicity). These control variables represent known differences between the control variable and the variables being measured in the present study. Mother's education level has demonstrated an influence on alcohol use (Singhammer & Mittelmark), gender has influenced school misbehavior and alcohol use (Suls & Green, 2003; Hart & Mueller, 2013; Dumas et al., 2013), and race/ethnicity had influenced alcohol use and school misbehavior (Pacek, 2012; Voelkl et al., 1999; Mrug & McCay 2013).

Chapter III

Method

Sample and Data Collection Procedures

For the purposes of this study, data from the 10th grade student cohort of the 2008 MTF

public use data set from the Interuniversity Consortium for Political and Social Research

(ICPSR) were used (Johnston et al., 2008). The primary objective of this annual national

survey was to explore changes in values, behaviors, and lifestyle orientations of

contemporary American youth, with a particular emphasis on drug use-related behaviors,

attitudes, and characteristics. In the 2008 MTF cohort 15,518 10th grade students

completed the survey. There were four surveys given in 2008, which thereby created four

nationally representative datasets (Johnston et al., 2008). As described in detail in chapter

4, a subset of 3,389 10th grade students from this cohort were used in the current study,

because the variables described and used in this study were all collected from one of the

surveys taken by MTF during the 2008 survey. Sample characteristics of the analysis

sample are also presented in chapter 4.

The basic research design involves annual data collections during the spring of

each year. Specifically, a multi-stage probability sampling strategy was used to obtain a

nationally representative sample of 10th graders. During stage one, specific geographical

areas were randomly sampled. The geographic areas used in this study were the primary

sampling units (PSUs) developed by the Sampling Section of the Survey Research Center

for use in the Center's nationwide interview studies (Johnston et al., 2008). During stage

two, one or multiple schools were randomly selected. In all cases, the selections of

schools were made such that the probability of drawing a school was proportionate to the

size of its eighth or tenth grade class. When a sampled school was unwilling to participate, a replacement school as similar to it as possible was selected from the same geographic area (Johnston et al., 2008). Finally, during stage three students within the identified schools were selected for completing the survey. Within each selected school, up to about 350 students were included in the data collection. In schools with fewer than 350 students, all students were invited to participate in the study. In larger schools, a subset of students was selected either by randomly sampling classrooms or by some other random method that was convenient for the school and judged to be unbiased. Sample weights were assigned to each respondent so as to take account of variations in the sizes of samples from one school to another, as well as the (smaller) variations in selection probabilities occurring at the earlier stages of sampling (Johnston et al., 2008). For the tenth grade sample, about 130 high schools were sampled, and approximately 15,000 to 17,000 students were surveyed. This provides an accurate cross-section of 10th grade students throughout the United States. A limitation to the study design is that two segments of the entire age-cohort are missing: those who were enrolled in school, but were absent on the day of data collection ("absentees"), and those who had dropped out of school ("dropouts"). Dropout rates are relatively low for 10th graders. According to the MTF (Johnston et al., 2008), dropouts are probably less than 5% by 10th grade, and absentees comprise about 12% of tenth graders in 2008. Although absentees are likely to be somewhat different from non-absentees on a variety of dimensions, adjusting for their relatively small proportions would have only very modest effects on population estimates according to Johnston et al. (2008).

The procedures for completing the surveys were straight forward. Surveys were administered in the students' schools by trained interviewers. Students were given pencils and asked to use them for recording their answers to the survey questions because the survey questionnaires were designed for automated scanning. Generally, students who completed the survey finished within a 45 minute class period; and for students who were unable to complete the survey during the 45 minute period there was an effort to provide additional time. Confidentiality was emphasized on recruitment flyers and at the beginning of the survey. No personal information was collected on the survey, such as name or contact information. About 10 days before the survey is conducted at the high school campus, flyers are distributed to the students describing the study. Moreover, advance letters are distributed to parents which informed them about the study and provided them the means for declining their child's participation in the study. As a token of appreciation, a follow-up questionnaire and small monetary gift are sent to the participants in a self-address, stamped envelope. Though the specific reliability and validity measures were not reported for MTF, all of the survey items used meet expert consensus and are fit to be used in this study.

The data for this study were obtained by communicating with a researcher at the Substance Abuse & Mental Health Data Archive (SAMHDA). The researcher provided authorization and internet access to the public use data files. Once permission was obtained from SAMHDA, a formal IRB request to use the public data file for research purposes was submitted and approved by the University of Houston Committee for the Protection of Human Subjects.

Measures

  The current study included only a subset of the measures collected during the surveys. The four main variables to be used in this research study were measured at 10th grade: academic achievement, school bonding, school misbehavior, and alcohol use. Constructs and items are summarized in Table 1, along with means and standard deviations.

Table 1
Summary of Constructs and Items with Means and Standard Deviations
(N = 3,389)

Construct	Item	Mean	SD
Academic Achievement			
	GPA	5.92	2.273
School Bonding			
	Enjoy school	3.22	1.020
	Hate school (inverted)	2.04	1.265
	School work interesting	2.75	0.960
School Misbehavior			
	Office referral	1.52	0.886
	Skipped a class period	1.36	0.987
	Skipped a school day	1.37	0.859
	Suspended	.27	0.443
Alcohol Use			
	Alcohol use last 30 days	1.52	1.021
	Ever used alcohol	1.19	0.564

Note. This statistical analysis was performed in SPSS and did not account for sample weights, due to limitations in the software

Academic Achievement. Academic achievement was measured by using a single item from the student questionnaire, namely, students' self-report of their grade point average during the current school year (i.e., "Which of the following best describes your average grade in this school year?"). Possible response options were: 1=D, 2=C-, 3=C, 4=C+, 5=B-, 6=B, 7=B+, 8=A-, 9=A. Higher values on this measure indicated better academic achievement. Self-reported grades tend to correlate very highly with school-reported grades (Crockett, Schulenberg, & Petersen, 1987), "[t]he correlations were uniformly high for course grades, the coefficients ranged from .70 to .84 (median $r =$ .76)" (Crockett, Schulenberg, & Petersen, 1987, p.387). However, Kuncel, Crede, and Thomas (2005) suggested using caution when using self-reported grade point averages, as

some groups such as high achievers show higher levels of accuracy than poor achieving students when reporting grade point averages on surveys.

School Bonding. School bonding was measured with three questionnaire items regarding students' attitudes toward school over the past year (i.e., "Now thinking back over the past year in school, how often did you: 1) enjoy being at school, 2) hate being at school, and 3) find your course work interesting"). Possible responses for each item were: 1=never, 2=seldom, 3=sometimes, 4=often, 5=almost always. Though the literature varies widely on how to operationalize this variable, Bryant et al. (2000) used similar indicators of students' attachment and bonding to school, based on liking school, disliking school, and being interested in schoolwork (Hawkins et al., 1997). A total score was computed by calculating the average of the responses across the three items. The second item, hate being at school, was inverted prior to the calculation of the total scores. Higher values of the average score indicated higher school bonding.

School Misbehavior. Bryant et al. (2000) measured school misbehavior with four questionnaire items about the frequency of truancy, suspensions, and misbehavior. These indicators were used in the present study to assess school misbehavior. Specific questions for this domain were included for the following four items from the MTF data: First, "Now thinking back over the past year in school, how often did you get sent to the office, or have to stay after school, because you misbehaved?" (response options: 1=never, 2=seldom, 3=sometime, 4=often, 5=always). Second, "During the last four weeks, how often have you gone to school, but skipped a class when you weren't supposed to?", with possible responses: 1=not at all, 2= 1 or 2 times, 3= 3-5 times, 4= 6-10 times, 5=11-20 times, 6=more than 20 times. Third, "During the last four weeks, how many whole days

of school have you missed because you skipped or cut?" Possible responses include: 1 =
none, 2 = 1 day, 3 = 2 days, 4 = 3 days, 5 = 4-5 days, 6 = 6-10 days, 7 = 11-19 days, 8 =
20 or more days. Fourth, "Have you ever been suspended or expelled from school?"
Possible responses were 1 = no, 2 = yes, one time, 3 = yes, two or more times. A total
score was formed by computing the average across the four questions. Because the
response options were not uniform across the different items, each item was standardized
prior to computing the total score. Higher values on the total score will indicate a higher
frequency of school misbehavior.

   Alcohol Use. Drinking patterns for the past month were measured using a single
survey item (i.e., "On how many occasions have you had alcoholic beverages to drink-
more than just a few sips during the last 30 days?") (Johnston et al., 2008; NIAAA,
2002). Possible responses included: 1="0 Occasions" 2="1-2 Occasions" 3="3-5
Occasions" 4="6-9 Occasions" 5="10-19 Occasions" 6="20-39 Occasions" 7="40 or
More". In addition, initiation of alcohol use for 10th grade students was measured by
adolescents' reports of whether they had ever drunk alcohol (i.e., "Next, we want to ask
you about drinking alcoholic beverages, including beer, wine, liquor, and any other
beverage that contains alcohol. Have you ever had any alcoholic beverage to drink--more
than just a few sips?" (0 = no; 1 = yes). Approximately 61.2% of the total weighted
sample reported they had never drunk alcohol.

   Although studies have generally supported the validity of self-report data on
substance use, it is well documented that some underreporting or over-reporting may
occur. Tourangeau and Yan (2007) found that in survey studies misreporting about
sensitive topics is common and influenced by the circumstance under which the data was

collected. Additionally, the extent of misreporting depends on whether the respondent has anything uncomfortable to report and on the design features of the survey. The survey evidence also indicates misreporting on sensitive topics is essentially a motivated process in which respondents edit the information reported to avoid uncomfortable feelings in the presence of an interviewer or to avoid social repercussions. Studies indicate respondents are more willing to report sensitive information when the survey items are answered anonymously and the survey is self-administered rather than when they are administered by an interviewer (e.g., Crockett, Schulenberg, & Petersen, 1987).

To this end, O'Malley, Bachman, & Johnston (1983) found that conducting confidential surveys about alcohol and substance use yielded reliable and valid measures for research. Despite the benefits, the validity of data obtained through these surveys is still somewhat vulnerable to the respondents' self-presentation concerns. Johnson and Richter (2004) noted that when possible, researchers should make every effort to apply multiple methods of assessing sensitive behaviors, including self-reports, ratings by key informants (e.g., parents, peers), biological measures, and direct observation. Johnson and Richter (2004) further acknowledged that collecting such data on all participants in a large, national survey would be prohibitive; however, validating self-report responses using these alternative methods with a random subsample would be feasible and desirable.

Gmel and Rehm (2004) stated that minimal differences were found between self-report measures when the recall period was sufficiently long enough. Underreporting issues often resulted from the exclusion of subpopulations (Gmel & Rehm, 2004). Self-reports analyzed in the current study were collected across the span of the past 30 days,

and were gathered from a normative sample of adolescents in the US. Both features support the validity of the self-report data on alcohol consumption to be used in the present study.

In other research, both self-reported alcohol use surveys and urinalysis tests were taken from students averaging 15 years in age (Williams & Nowatzki, 2005). The researchers determined that, "[n]inety-three percent (315/340) of adolescents who reported no alcohol use within the alcohol detection window were negative for alcohol". Overall, the researchers found self-reported alcohol use surveys had a Kappa coefficient of .13 which indicates self-report measures for alcohol use are appropriate for research studies. Nevertheless, findings from the current study must be evaluated in light of the discussed potential measurement limitations.

Data Analysis

First, descriptive statistics were examined for each study variable including means and standard deviation, and distributional characteristics. The study hypotheses (see the hypothesized models shown in Figure 1 and 2) were tested via SEM. There are several assumptions which must be met so that SEM can be used, including minimum sample sizes and normally distributed continuous variables. Additionally, the reliability (internal consistency) of the multi-item variables was examined, as well as the bivariate correlations among the four domains. While the sample size exceeds minimum criteria (Kline 2011), it is important to affirm the normal distribution of the variables through graphical and/or statistical techniques. According to Kline (2011), "[a]n ideal sample size-to-parameter ratio would be 20:1" (p.12). Mplus reported the number of free parameters for the partially mediated model was 38, while the number of free parameters

for the fully mediated model was 36. If departures from normality will be found, then the steps described further below will be taken. Additional screening steps assessed linearity of relationships and checked for outliers. Next, the relationships between academic achievement, school misbehavior, school bonding and alcohol use were examined via latent variable analysis. A graphical representation of the two structural equation models that will be tested can be found in Figures 1 and 2. Figure 1 shows the partially mediated model of all study variables which will serve as a baseline model. Figure 2 represents the more parsimonious fully-mediated model.

Because the MTF data were obtained from multistage area probability sampling, the SEM analyses were performed with sample weights to account for the complex sampling design. However descriptive statistics were calculated using SPSS without accounting for sample weights due to program limitations. Structural equation modeling (SEM) analyses with single-indicator and latent variables was conducted to test the models and provided a simultaneous estimation of the parameters while accounting for attenuation in the structural coefficients due to measurement error. The SEM was analyses were conducted using Mplus. An estimation method was used which is designed to accommodate for sample weights (Muthén, & Muthén, 2007). Specifically, the MLR estimator was used during analysis in Mplus.

Various global fit indices were used to test the proposed model following the recommendations from Hu and Bentler (1999) and Schumacker and Lomax (2004). Specifically, the study examined the overall chi square test of model fit, where the test statistics should be non-significant (i.e., p>.05). The Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) was also used and should be less than .05 to

declare satisfactory fit. The standardized root mean square residual (SRMR, Bentler 1995) was inspected and should be less than .05. The Comparative Fit Index (CFI; Bentler, 1990), was examined and should be greater than 0.95. Because the chi-square statistic was biased due to the large sample size of this study (e.g., Bentler & Bonnett, 1980; see also Kline, 2011), less weight was given to this test statistic during model evaluation relative to the other fit indices. In addition, standardized residuals were inspected to identify potential areas of local misfit. The potential occurrence of Heywood cases was checked. A model chi-square difference test was conducted to determine whether the partially mediated model (Figure 1) or the fully mediated model (Figure 2) provided a significantly better fit to the data.

Chapter IV

Results

The purpose of this study was to test whether the associations of academic achievement with school misbehavior and alcohol use were fully or partially mediated by school bonding. Analyses were performed using data from the 10th grade student cohort of the 2008 MTF study. As stated above, 15,518 10th grade students had participated in one of the multiple versions of the 2008 MTF survey. Therefore, based on the variables included in the current study, the original dataset with the selected survey item included 5,416 10th grade participants. An inspection of the variables that are available in the different survey versions revealed that 2,027 of them had missing values on one or more study variables. Blank or incomplete survey data might have occurred for several reasons, such as user error (skipping a question), uncertainty of a response, and hesitation to answer a question (Johnston et al., 2008). While the exact reason for missing data is at times unclear, it is important to address this issue when preforming data analysis. To address the missing data, listwise deletion was used. As discussed in the expert literature (e.g., Graham, 2009; Graham et al., 2001; Schafer & Olsen, 1998; Schafer & Graham, 2002), listwise deletion is one of the oldest methods for dealing with incomplete data and use of more modern methods, such as multiple imputation or Full Information Maximum Likelihood, would have been more optimal to accommodate students with missing data in this study. Findings consequently should be evaluated keeping this potential study limitation in mind. The data set used for final analysis consisted of 3,389 participants.

Sample Characteristics

SPSS version 20 was used to compare the distributions of student race/ethnicity, student gender, and mother's highest educational level among the students who were excluded from analysis and those included in the final analytic sample.   The analysis completed in SPSS did not account for sample weights due to software limitations. Results of these analyses are shown in Tables 2, 3, and 4.

Table 2
Distribution of Participants by Race/Ethnicity

Race/ Ethnicity	Original sample with survey items		Excluded sample deletion sample		Listwise	
	N	Percentage	*N*	Percentage	*N*	Percentage
Black	729	13.4%	275	26.9%	454	13.4%
Hispanic	747	13.8%	232	22.7%	515	15.2%
White	2919	53.9%	499	48.9%	2420	71.4%
Missing	1021	18.9%	1021	50.4%	0	0%
Total	5416	100%	2027	100%	3389	100%

Note. This statistical analysis was performed in SPSS and did not account for sample weights, due to limitations in the software

Table 3
Distribution of Participants by Gender

	Original sample		Excluded sample		List-Wise deletion sample	
Gender	*N*	Percentage	*N*	Percentage	*N*	Percentage
Female	2559	47.2%	736	36.3%	1823	53.8%
Male	2542	46.9%	976	48.1%	1566	46.2%
Missing	315	5.8%	315	15.5%	0	0%
Total	5416	100%	2027	100.0%	3389	100%

Note. This statistical analysis was performed in SPSS and did not account for sample weights, due to limitations in the software

Table 4
Distribution of Participants by Highest Education Level Attained by Participants' Mothers

Education Level	Original sample		Excluded sample		List-Wise deletion sample	
	N	Percentage	*N*	Percentage	*N*	Percentage
Grade School	127	2.3%	39	1.9%	88	2.6%
Some High School	377	7.0%	93	4.6%	284	8.4%
High School Graduate	1075	19.8%	356	17.6%	719	21.2%
Some College	786	14.5%	136	6.7%	650	19.2%
College Graduate	1418	26.2%	470	23.2%	948	28.0%
Graduate School	736	13.6%	241	11.9%	495	14.6%
Don't Know	652	12.0%	447	22.1%	205	6.0%
Missing	245	4.5%	245	12.1%	0	0%
Total	5416	100%	2027	100.0%	3389	100%

Note. This statistical analysis was performed in SPSS and did not account for sample weights, due to limitations in the software

It is interesting to note that the distribution pattern shows that 68.4 % of the participants' mothers had either graduated from high school or graduated from college. Further, it is important to note the distributions of the sample prior to and after listwise

deletion. The percentages for race/ethnicity and gender maintained ordinal integrity, whereas mother's education level did not maintain ordinal integrity. However, even when ordinal order was maintained there were shifts in the weighting of the control variable. One example would be the shift of race/ethnicity. In the original data set, the White category was 53.9% as compared to the final list-wise deletion group where the White category was 71.4% of the sample. It should be noted that the race/ethnicity control variable had a large number (N=1021) of participants with missing data. This translates into 18.9% of the sample who did not respond to this survey item.

It is also important to discuss how the list-wise deletion sample compares to national averages. According to the US Census Bureau (2014), race/ethnicity are distributed as follows: Black 13.1%, Hispanic, 16.9%, and White 63.3%. These findings are similar to the final sample used for analysis in this study. The US Census Bureau (2014) reports gender distribution to be 50.8% female and 49.2% male. Which means sampling distribution, according to SPSS (where there was no accounting for sample weight), varied from the current sample distribution.

Confirmatory Factor Analysis (CFA)

As recommended by various scholars for SEM analyses with latent variables (Anderson & Gerbing, 1988), the fit of the measurement model was evaluated prior to testing the structural model. In order to determine the soundness of the constructs described in the methods section, several confirmatory factor analyses (CFA) were conducted for each latent construct using MPLUS while accounting for sample weights. Note that academic achievement and alcohol use were each assessed with a single

indicator. Academic achievement was measured through self-reported GPA. Alcohol

use was reported by survey item, "On how many occasions have you had alcoholic

beverages to drink-more than just a few sips during the last 30 days?" (Johnston et al.,

2008). Therefore, no CFA was completed for these variables. For the other two latent

constructs, various model specifications were examined thoroughly based on model fit,

indications of potential local misfit (e.g., standardized residuals), and practical

significance or convergent validity (e.g., percentage of explained variance for each

manifest indicator). Briefly summarizing, all survey items were kept in the final analysis

except, "Have you ever been suspended or expelled from school?" This item was not

included in the final analysis because it did not load significantly on the school

misbehavior factor. All other hypothesized survey items were supported through CFA

and included during tests of the structural model (i.e., the fully and partially mediator

models).

Table 5

Factor Loadings on the School Bonding Construct

	Unstandardized	Standardized	S.E.	Est./S.E.	Two Tailed P-Value
Enjoy School	1.000	0.880	0.016	54.629	0.000
Interested in Schoolwork	0.577	0.541	0.019	27.984	0.000
Inverted Hate School	0.881	0.745	0.017	42.612	0.000

Note. Sample weights were accounted for in this analysis.

Table 6
Factor Loadings on the School Misbehavior Construct

	Unstandardized	Standardized	S.E.	Est./S.E.	Two Tailed P-Value
Schoolwork not turned in	1.000	0.517	0.026	20.090	0.000
Truancy	1.282	0.577	0.026	22.041	0.000
Office Referral	1.020	0.668	0.028	23.765	0.000

Note. Sample weights were accounted for in this analysis.

Results of the final set of CFA models supported the specified measurement models for the school bonding construct (Chi-2 (3) = 1539.637, p =0.000, CFI = 1.000, RMSEA = 0.000 and the school misbehavior construct (Chi-2 (3) = 610.414, p = 0.000, CFI = 1.000, RMSEA = 0.000). Factor loadings for the two constructs from this final set of CFA models are shown in Tables 5 and 6. As can be seen, all factor loadings were

significant but not always as high as originally expected (i.e., standardized factor loadings greater than .60).

Structural Equation Models

Next, the two mediator models were tested using MPLUS while accounting for sample weights and controlling for student's race/ethnicity and gender as well as mother's highest education level. The partially mediated model allowed for all relationships to be estimated while controlling for the mentioned control variables. The fit indices for this model were $X^2_{MLR\,(32)} = 376.601$, p=0.000, RMSEA=0.056 (90% C.I. 0.051, 0.062), SRMSR=0.030, CFI=0.918. As indicated in the methods section, these model fit values fall near to the cut-off values for good model fit set forth in this study. Due to the large sample size, the model chi-square test was likely biased and its *p*-value was thus not considered for evaluating model fit. The SRMR model fit values satisfied criteria for good model fit, whereas values for the RMSEA and the CFI indices were borderline acceptable (Kline 2011). However, some of the indices were within acceptable ranges for the partially mediated model. For example, Browne & Cudeck (1993) indicate RMSEA should be less than .08, but Stieger (1990) indicates that RMSEA should ideally be less than .05. While values less than .05 indicate good fit current research supports values as high as .08 as acceptable errors of approximation (Browne & Cudeck, 1993; Steiger, 1990, Wiesner & Schanding, 2013). The reported RMSEA for the fully model was 0.058, which would be acceptable for some researchers. Overall, the partially mediated model was marginally supported by the observed data. Standardized regression coefficients for the partially mediated model are shown in Figure 3.
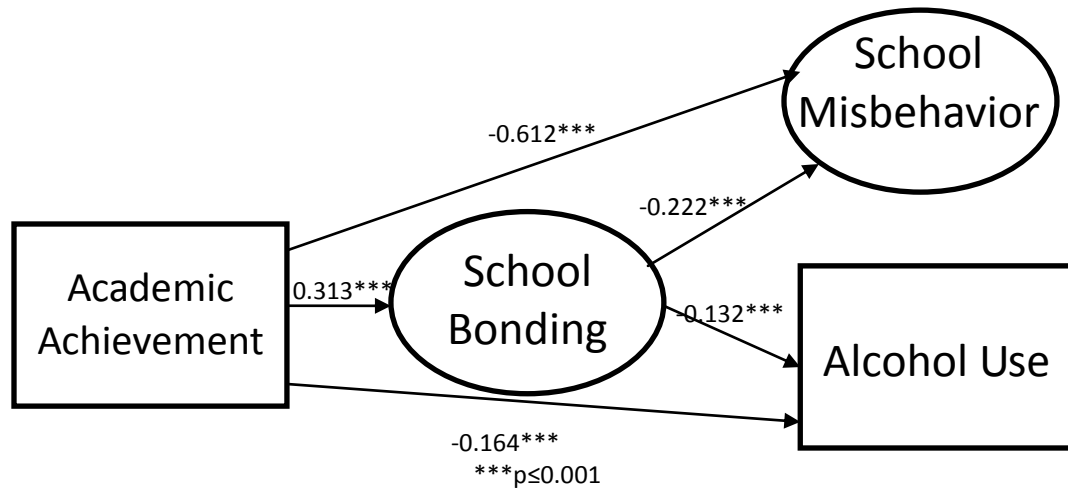
Figure 3. Results for Partially Mediated Model

Note. Shown are standardized regression coefficients.

As can be seen in Figure 3, many of the original hypotheses were supported. As hypothesized, academic achievement has an inverse relationship with school misbehavior and alcohol use and a positive relationship with school bonding. While the partially mediated model was marginally supported through the present research, the fully mediated model was not supported (as described below). Therefore the original hypothesis related to the fully mediated model being the best fit for the data was not supported. Further the two models were examined to determine which model was preferable and supported by the data. For example academic achievement was negatively associated with school misbehavior and alcohol use. This was true for both direct and mediated effects. Next, the fully mediated model was tested. Its obtained model fit values were $X^2_{MLR\,(34)}$ =871.559, p=0.000, RMSEA=0.085 (90% C.I. 0.080, 0.090), SRMSR=0.058, CFI=0.801. These model fit values do not satisfy criteria for

good model fit. This may be in part due to any number of factors and will be discussed in the discussion section.

  Based on the findings described above, the partially mediated model was selected as the preferable model.

Chapter V

Discussion

The aim of this study was to test whether the associations of academic achievement with school misbehavior and alcohol use were fully or partially mediated by school bonding. Further, this study examined the association academic achievement has on school misbehavior and alcohol use while considering the mediating influence of school bonding through the lens of a nationally representative sample of 10th graders. As presented earlier, there are many models which demonstrate the relationships between these variables (Bryan et al., 2000; Hawkins 1997). This study adds to the base of knowledge to help researchers further develop models concerning the relationships of these variables. In detail, structural equation models were explored to assist in clarifying some of the questions raised prior to this research. These models were based in part on a prior theoretical model (social development model theory) and prior research (Bryant et. al, 2000).

Statistical findings were reported in chapter 4. Two competing structural equation models (SEM) were examined. As a baseline model, a fully saturated model was tested first in which all structural parameters were freely estimated (Kline 2011). In this model, all relationships within the SEM were considered. This was the better of two models, though it showed only a marginally acceptable fit (Kline 2011).

Next, the more parsimonious fully mediated model was tested which was developed based on existing research (Crosnoe, Erickson, & Dornbusch, 2002, Bryant et al., 2000, Hawkins, 1997). It was hypothesized that the relationship of academic

achievement on school misbehavior and alcohol use will be mediated by school bonding. This model was not supported by the observed data.

Additionally, it was hypothesized that academic achievement would be negatively associated with school misbehavior and alcohol use. This hypothesis was marginally supported by the partially mediated SEM model, further weakly supporting previous research (Bryant & Zimmerman 2002; Oelsner et al., 2011;Townsend, Flisher & King, 2007) indicating the association among these variables. The hypothesis, in which, increasing academic achievement would be related to decreased school misbehavior and alcohol use, when fully mediated by school bonding was not supported by the findings. However, increasing academic achievement would be related to decreased school misbehavior and alcohol use, while academic achievement being partially mediated by school bonding was marginally supported. School bonding is a factor which can enhance positive effects of certain variables, and should be considered as a variable to be included, assessed, and explored to a larger extent than it current is being used when researchers design and implement future studies.

Limitations

There were several limitations associated with this study. While using list-wise deletion can be an acceptable statistical method for dealing with missing data, this step does not allow for all data to be considered. Especially, when considering advancements in dealing with missing data as demonstrated by Graham et al. (2007) and Schafer and Olsen (1998). It is also important to note that when relying on survey data there are limitations to the accuracy of the data collected (Johnson et al., 2004; Williams & Nowatzki, 2005). If survey data had been verified by drug testing or collecting data from the school about

GPA, then some of the survey items would be more accurate about the information reported. Further, this data set considered only 10th grade students. Based on this study alone it is unclear if the findings apply to all secondary students, or even if they apply to students in the 10th grade over the course of several years. Another limitation to the study design is that two segments of the entire age-cohort are missing: those who were enrolled in school, but were absent on the day of data collection ("absentees"), and those who had dropped out of school ("dropouts").

There are at least four possible ways in which this survey may not be fully representative of the adolescents from the 48 contiguous United States (Johnston et al., 2008). First, there were sample schools who refused to participate, which may have introduced some bias. Second, in some instances, none of the invited students within a selected school participated in the survey, which also may have led to sampling bias. Third, the questionnaire responses recorded by participating students may have been open to both conscious and unconscious distortions, which may have reduced the validity of the self-reported data. Fourth, limitations in sample size and/or design could have placed limits on the accuracy of estimates. Specifically, given that there were differing versions of the survey used for data collection, the statistical power of a sample size of 3389 is weaker than the entire surveys sample of more than 15,000 students. It is also important to note that the original data were collected in 2008. Therefore the age of the data set may also be considered a limitation because it does not represent the most current student population.

Another challenge with this data set was the size of the data and the complex design of the survey data. This leads to another limitation- the SPSS software was not

sufficiently equipped for accounting for all sample weights. This led to descriptive statistics being reported which did not account for sample weights. Additionally, though the survey items used to create the school bonding variable were used in previous studies, it would have been ideal to administer a questionnaire specifically designed for robustly measuring school bonding.

Recommendations for Future Research

Based on the findings and the discussion to this point, there are several areas in which this study illuminates the potential for further research. First, a longitudinal study (the current study used cross-sectional data) would yield more robust results with much greater statistical power and significance (Ghazarian & Roche, 2010; Martin, 2011; Wu et al., 2013). This would also allow for more advanced statistical analysis and yield a broader understanding of these factors as they are observed over time. It would also allow researchers to measure and understand changes among the reported relationships as they not only vary over time, but also vary based on developmental stages of students over the course of their elementary and secondary education. Second, repeating or replicating a similar analysis over the course of several years would allow comparison on of the data among various cohorts of 10th grade students. This form of research would add to the base of knowledge currently being presented and allow trends to be observed and discussed.

Third, future research could complete similar studies on a more localized level. The current study extrapolated data from a nationally representative data set. There may be important differences in these findings if the research was conducted for a specific region or state, thus providing insight into a more localized area. Finally, this research

suggests the importance of developing additional measures of school bonding to optimize the operationalization of this construct (Bryant et al., 2003; Hawkins et al., 1997; Hirschi, 1969). This research could also lead scholars to understand a wider range of relationships which would allow for the mediating effect of school bonding on other variables (both delinquent behaviors and prosocial behaviors).

Conclusion

It has been documented that adolescent delinquent behavior and risk factors have a significant impact on how a student transitions into adulthood (Chasin, Flora & King, 2004). Further, these factors can have an influence on the developmental trajectory a student takes once in adulthood (Newcomb & Bentler, 1988). Catalano et al., (1996) has identified school misbehavior, academic achievement, school bonding, and alcohol use as important interrelated domains during adolescence, while it is also documented that these factors influence pathways from adolescence into adulthood (Andreasson, Allebeck, Brandt, & Romelsjo, 1992; Chassin, Flora, & King, 2004). This research demonstrates the potential for influencing a system change when working with a mediating factor such as school bonding. It is important for school personnel, parents and communities to realize the impact that school bonding can have on a student, their overall experience with secondary education, and their trajectory into adulthood. It is time for schools to consider more than just the curriculum being taught, but to remember the importance of connecting with the students. There are many times in life, when we try to isolate one thing, to increase convenience or simplicity, but in the end we learn there are connections all around. School bonding has the potential to reengage students, influence relationships with system, and help school personnel remember a day and age when students were

more than mindless computers preforming educational task. Engaging students on levels

whereby they perceive a connection with the school beyond simple academics is essential

to building student success.

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