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School Disengagement as a Predictor of Dropout, Delinquency, and Problem Substance Use during Adolescence and Early Adulthood

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Abstract

Over the past five years, a great deal of attention has been paid to the development of early warning systems for dropout prevention. These warning systems use a set of indicators based on official school records to identify youth at risk for dropout and then appropriately target intervention. The current study builds on this work by assessing the extent to which a school disengagement warning index predicts not only dropout but also other problem behaviors during middle adolescence, late adolescence, and early adulthood. Data from the Rochester Youth Development Study (*n*=911, 73% male, 68% African American, and 17% Latino) were used to examine the effects of a school disengagement warning index based on official 8th and 9th grade school records on subsequent dropout, as well as serious delinquency, official offending, and problem substance use during middle adolescence, late adolescence, and early adulthood. Results indicate that the school disengagement warning index is robustly related to dropout as well as serious problem behaviors across the three developmental stages, even after controlling for important potential confounders. High school dropout mediates the effect of the warning index on serious problem behaviors in early adulthood.

Keywords

school disengagement; delinquency; substance use; urban; development; risk and protective

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Academic underachievement is far more common in American society than one would hope. National educational statistics indicate that only 34% of 8th-grade students are proficient in math (U.S. Department of Education, 2010), only 32% of 8th-grade students are proficient

in reading (U.S. Department of Education, 2010), and only 69% of students graduate from high school on time, with a regular diploma (Editorial Projects in Education Research Center, 2009). The truly negative implications of academic underachievement become apparent once they are disaggregated by race and ethnicity. African American, Latino, and American Indian proficiency rates in math and reading are less than half that of White students and the graduation rate among historically underserved minority students is 25 percentage points lower than among white students. Academic underachievement is indeed a major problem in the U.S.

Academic underachievement has lasting negative consequences for the individual, his or her family, and society at large. Much of the work to quantify these effects has considered the consequences associated with school dropout, the culmination of the longer process of school disengagement. These studies indicate that failure to graduate from high school results in substantially lower earnings over the life course (Rouse, 2005), dramatically poorer health (Muennig, 2005), considerably more dependence on public assistance (Waldfogel, Garfinkel, & Kelly, 2005), and a marked increase in the likelihood of involvement in crime and incarceration (Moretti, 2005). Moreover, the inequalities in academic achievement between majority and minority ethnic groups produce disparities in health and prosperity across the life course (Woolf, 2007). Academic underachievement is clearly a major public health concern.

Understanding school dropout and its consequences is obviously important but focusing on dropout status may have limited value for the development of effective prevention programs and remedial services to ward off later negative outcomes. Once youth drop out of school, they leave the control of the school environment and they are often difficult to reach in the community. As a result, it is a challenge to provide appropriate services to them and their families. Dropping out of school, however, is only the end of the more general process of school disengagement, a process that typically begins earlier in the educational career. In terms of prevention, measuring early school disengagement may be more beneficial, compared to assessing dropout alone.

A strategy is needed to recognize early school disengagement and potential dropout. Accordingly, recent research has begun to develop early warning systems that identify youth who have started to disengage and are at risk for dropping out of high school (Heppen & Bowles Therriault, 2008; Neild, Balfanz, & Herzog, 2007). The intent of these efforts is to identify at-risk youth early enough so that effective intervention strategies may be employed. This identification process typically relies on school record data, including indicators of course failure, poor attendance, GPA, low achievement on standardized test scores, and school suspensions. Studies of early warning systems demonstrate that as the number of risk indicators increases, the likelihood of dropout also increases (Heppen & Bowles Therriault, 2008; Neild, Balfanz, & Herzog, 2007). Early warning systems can be an invaluable tool for identifying school disengagement trajectories and preventing dropout.

In this study, we examine an early warning index, referred to here as the school disengagement warning index, and its relationship with problem behavior outcomes during adolescence and into young adulthood. We build on existing early warning system work by

assessing the extent to which a school disengagement warning index constructed from 8th and 9th grade school records predicts not only dropout (the outcome of interest in prior work), but also serious delinquency and problem substance use measured during middle adolescence (contemporaneous to the measurement of the school disengagement warning index—ages 15–16), late adolescence (ages 17–18), and during early adulthood (ages 21–23). If the school disengagement warning index is also related to other serious problem behaviors, it will indicate that youth who are identified as at risk for school dropout are also at risk for an array of other negative outcomes during the course of adolescence and early adulthood. Our study also extends the findings of previous studies by assessing the predictive utility of the early warning index on high school dropout and other problem behaviors after adjusting for shared risk factors (i.e., variables that lead to both early indicators of dropout as well as eventual dropout and other problem outcomes). If the school disengagement warning index is shown to be related to later negative consequences, then that finding will have important implications for the development of prevention programs and remedial services. These youth, even though they may be disengaged from school, are still enrolled in school and, as a result, it is likely easier to reach them and their families to provide resources and services. Unfortunately, little research has focused on this issue, particularly with objective measures of school disengagement from official school records. Moreover, the studies that have examined the consequences of earlier school disengagement have typically utilized contemporaneous data or short-term follow-up periods to assess outcomes and have typically failed to control for relevant potential confounders. The purpose of this paper, therefore, is to address the gap in the literature by examining the utility of a school disengagement warning index to predict dropout and a set of problem behaviors during adolescence and into young adulthood.

It is also important to determine the potential mechanisms that link earlier school disengagement with continued involvement in problem behaviors after the student has left school. Therefore, we also assess the mediating role that dropout status may play in explaining the effect of the school disengagement warning index on these problem behaviors during early adulthood. The purpose of the mediation inquiry is to determine if high school dropout is an intermediary variable in the behavioral chain that links earlier school disengagement to problem outcomes in early adulthood. If the school disengagement warning index, either directly or indirectly via dropout status, is related to the outcomes, then it highlights the importance of using early disengagement as an intervention target, rather than focusing solely or primarily on dropout status. Understanding the degree to which dropout mediates the relationship between school disengagement and problem outcomes will have implications for prevention and intervention efforts.

This analysis uses data from the Rochester Youth Development Study. By relying on the long-term follow-up data collected in the Rochester study, we are able to examine the impact of both earlier indicators of school disengagement and later drop out status on outcomes measured during adolescence and the transition to adulthood. Our ultimate purpose is to contribute to a limited but important body of research needed to inform interventions seeking both to reduce levels of school disengagement and to ward off its potential long-term negative consequences.

Previous Studies of School Disengagement

We begin with a brief review of studies that document the impact of school disengagement during adolescence on problem behaviors. Previous studies have utilized a variety of indicators of the broader concept of school disengagement—such as school connectedness, grade point average, and truancy—but very few have used a comprehensive approach to measurement or utilized objective indicators based on official school records. We divide our discussion of these studies into three categories—those that report on contemporaneous effects, those that report on short-term effects, and those that report on longer-term effects. All studies that control for baseline measures of the outcome of interest are noted. Research on school disengagement and problem outcomes are summarized below.

Contemporaneous impact of school disengagement on negative consequences—The bulk of the work in this area has focused on the contemporaneous relationship between school disengagement and problem outcomes. Several studies report an association between poor school bonding or attachment and problem behaviors (Simons-Morton, Crump, Haynie, & Saylor, 1999), delinquency (Cernkovich & Giordano, 1992; Payne, Gottfredson, & Gottfredson, 2003), violence (Resnick et al., 1997), and drug use (Henry, Thornberry, & Huizinga, 2009). Similarly, a negative relationship between grade point average (GPA) and violence has also been documented (Resnick et al., 1997). Using longitudinal data, but assessing with-in time-period effects, Henry and Huizinga (2007) reported that truancy was associated with the likelihood of initiating alcohol, marijuana, and cigarette smoking among at-risk, urban youth. In sum, cross-sectional research shows that school disengagement has a contemporaneous impact on a variety of problem behaviors.

Short-term impact of school disengagement on negative consequences—A small body of research using short-term follow-up periods shows that school disengagement is associated with negative outcomes. There are few longitudinal studies that can disentangle temporal order and can identify the developmental sequence of risk. Of those that do exist, the follow-up periods are, unfortunately, relatively short. For instance, O'Donnell, Hawkins, and Abbott (1995) found that low levels of school bonding and academic achievement at ages 12 to 13 predicted serious delinquency and drug use one year later. Using a sample of students from the Netherlands, Weerman, Harland, and van der Laan (2007) found that school misbehavior in seventh and ninth grade predicted serious delinquency outside of school one year later. Borowsky, Ireland, and Resnick (2002) found that grade retention, school problems, GPA, school connectedness, and skipping school predicted violence one year later, net of baseline measures of violence perpetration. Henry et al. (2009) and Henry and Thornberry (2010) demonstrated that truancy was associated with the subsequent onset and escalation of marijuana use among urban adolescents, after adjusting for baseline measures of general delinquency. School disengagement was also related to the initiation and escalation of drug use over the course of adolescence in a nationally representative cohort of the Monitoring the Future Study (Bachman, O'Malley, Schulenberg, Johnston, Freedman-Doan & Messersmith, 2008). Even though research finds that school disengagement is related to a variety of problem behaviors, the follow-up periods are not extensive.

Studies using somewhat longer follow-up periods also document an association between school disengagement and problematic outcomes. Herrenkohl, Hill, Chung, Guo, Abbott, and Hawkins (2003) found that school bonding at age 15 predicted a reduction in violence at age 18 among children who were already deemed aggressive at age 10. Likewise, Bond, Butler, Thomas, Carlin, Glover, Bowes et al. (2007) demonstrated that, net of baseline measures, students' school connectedness in eighth grade predicted alcohol and drug use two years later. In addition, Dishion, Nelson, and Yasui (2005) found that sixth-grade academic failure and antisocial behavior predicted eighth-grade gang involvement. Henry (2010) found that lower GPA in sixth grade was associated with the escalation of drug use over the course of junior high school (seventh to ninth grade) among rural youth, controlling for baseline drug use. Last, Farrington (1989) showed that school failure predicted aggression at ages 12 to 14. Clearly, the weight of the evidence indicates that school disengagement has a variety of short-term negative consequences for the individual. Most of these studies, however, measured the outcomes only one or two years after the assessment of school disengagement and several studies did not control for baseline measures of the outcome. Nevertheless, research demonstrates the deleterious short-term effects of school disengagement on problem behaviors.

Long-term impact of school disengagement on negative consequences—
Research on the long-term effects is minimal and inconsistent. Few studies have examined the long-term consequences of school disengagement on later adult problem behaviors and virtually all of these studies consider the culmination of the process, school dropout, rather than earlier manifestations of school disengagement. Moreover, the studies that have been conducted produce somewhat mixed results. In one of the earliest longitudinal studies on the relationship between school dropout and later delinquency, Elliott and Voss (1974) showed that delinquency decreased after dropout; however, once residual gain scores were used and the effects of prior delinquency were parceled out the effect was no longer statistically significant. More recently, Sweeten, Bushway, and Paternoster (2009) also reported that dropout status itself was not related to later involvement in delinquency but rather factors leading up to dropping out were predictive. In contrast, Thornberry, Moore and Christenson (1985) found that dropping out was positively related to arrest through age 25, controlling for age, race, and social status. Jarjoura (1993) showed that dropping out predicted delinquency (i.e., violence, theft, and selling drugs) one-year post graduation even though age and prior offending explained much of the relationship. Drapela (2005) found that dropout and drug use were only weakly related and that antecedent variables, such as school discipline problems and pre-dropout levels of drug use, were better predictors of later drug use than dropout itself. Overall, previous research is somewhat inconsistent with respect to the relationship between school dropout and subsequent adult offending.

It is clear that more research is needed. Some studies find that crime decreases after youth drop out of high school, which may be due to a maturation effect, while others find that crime increases. Moreover, for those studies that do find that dropout status is positively related to later problem behaviors, once antecedent variables are controlled, dropout status appears to be a relatively weak predictor of delinquency and drug use. Unfortunately, there is little information to indicate whether earlier school disengagement is or is not strongly

related to later problem behavior. Incorporation of both high school dropout status and earlier school disengagement indicators may provide a richer picture of how the longer-term process of school disengagement contributes to problem behavior among young adults. There is a pressing need for a better understanding of the development of school disengagement, its potential consequences, and the extent to which early warning systems may be used as a prevention mechanism for reducing subsequent involvement in various forms of delinquency and substance use. Additional research will push forward our understanding of these processes.

Current Study and Hypotheses

The current study will contribute to this mission by using longitudinal, prospective data to determine if a school disengagement warning index is related to subsequent dropout as well as other problem behaviors during adolescence and early adulthood. This study adds to the literature in several ways. First, we utilize a school disengagement warning index based on official school record data—including academic performance, attendance, and behavior at school. Second, we assess the effect of the school disengagement warning index on subsequent dropout and a broad set of problem behavior outcomes—including serious delinquency, criminal justice involvement, and problem substance use—each measured during middle adolescence, late adolescence, and early adulthood. Third, we assess these relationships after adjusting for common antecedents of school disengagement and prior measures of our outcome variables of interest. This is critical as major risk and protective factors for delinquency and substance use are also salient predictors of poor school engagement. Fourth, for the early adult outcomes, we also examine the impact of school dropout status and the extent to which dropping out of school mediates the effect of the school disengagement warning index on serious delinquency and problem substance use. Using these four strategies, the current study will advance the school disengagement and problem behavior literature by testing the following hypotheses. First, we hypothesize that holding constant important shared risk factors, the school disengagement warning index will be associated with subsequent dropout, serious delinquency, and problem substance use in each developmental phase. Then, we further hypothesize that dropout status will play an intermediary role in the impact of the school disengagement warning index on serious delinquency and problem substance use in early adulthood. Given these hypotheses, our study will provide a clear picture of the process and consequences of school disengagement, as measured by official school records.

Methods

Sample

We use data from the Rochester Youth Development Study (RYDS), a longitudinal panel study that began in 1988 with 1,000 7th- and 8th-grade students. Boys and students from neighborhoods with high resident arrest rates were oversampled because they are at greater risk for problem behaviors. Because gender and neighborhood arrest rates were used to formulate the probability of selection, they are predictors in all models.

Since 1988, sample members and an adult caregiver, overwhelmingly the biological mother (85%), have been repeatedly interviewed (14 times and 11 times, respectively), and data from school, police, and child welfare records have been collected. Here, we rely on data from the first 12 interviews. Interview Waves 1 to 9 were conducted at six-month intervals (ages 14 to 18) and Waves 10 to 12 at annual intervals (ages 21 to 23). At Wave 1, the average age was 13.9 (SD = .78) and at Wave 12 it was 22.7 (SD = .81). The sample is 73% men and 27% women; 68% of the participants are African American, 17% are Hispanic, and 15% are White. At Wave 12, retention was 85% for the focal subjects and 83% for the caregivers, with no evidence of differential subject loss. The Institutional Review Board at the University at Albany approved all study procedures. The study was explained and written informed consent obtained from adult participants (for both themselves and their minor children); assent was obtained from minor children. For the present study, we excluded youth who were missing on all dependent variables; this resulted in a sample size of 911.

School Disengagement Warning Index

The primary predictor of interest is the focal respondent's score on the *school disengagement warning index.* It is calculated from Rochester City School District official school records from each student's eighth and ninth school year and is the sum of five binary risk indicators that were defined by the district: (a) standardized test scores (scoring not proficient in one or more subjects), (b) attendance (missed 20% or more of the school days in a given school year), (c) failing one or more core subjects, (d) one or more suspensions from school, and (e) grade retention. These five risk indicators were summed within each grade level to create a score ranging from zero (no risk indicators) to five (all risk indicators). The maximum score across eighth and ninth grade was used to define the school disengagement warning index used in this study. Of the 911 students considered in this study, 182 (20.0%) had no risk indicators, 191 (21.0%) had one risk indicator, 183 (20.1%) had two risk indicators, 163 (17.9%) had three risk indicators, 134 (14.7%) had four risk indicators, and 58 (6.4%) had all five risk indicators.

High School Dropout Status

We consider *high school dropout status* in this study as an outcome and as a mediator. Self-report records from the young adult interviews (Waves 10–12) were used to create a binary variable that compares individuals who graduated from high school with a regular high school diploma (53.6% of the sample) to those who either dropped out or completed a general education degree.

Self-reported Offending and Official Arrest/Police Contact Outcomes

A series of outcome variables measured in middle adolescence (ages 15–16), late adolescence (ages 17–18), and early adulthood (ages 21–23) are considered. At each interview, we asked respondents to self-report the frequency of criminal offending during the interval between the previous interview and the current one. During adolescence, this was typically a 6-month interval and, during early adulthood, it was typically an annual interval. Two self-report indices are used: *serious violent crime* (attacking someone with a

weapon, gang fighting, robbery, and rape) and *serious property crime* (breaking and entering, theft of an item over $50, purchase of stolen goods, and theft of a vehicle). In addition, a count of *official arrest and police contacts* is based on a statewide search of New York State records covering these same age periods. All three antisocial outcomes were coded to compare individuals who engaged in the behavior (i.e., serious violent crime, serious property crime, or official arrest/police contract) one or more times during the developmental period of interest, to those who did not engage in the behavior during the developmental period (i.e., a binary indicator).

Problem Alcohol and Drug Use Outcomes

Two measures, *problem alcohol use* and *problem drug use*, are 6-item inventories of problem substance use modeled after the diagnostic content of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (1994). Example items include the need to use more (alcohol or drugs) to get the same effect, getting into trouble with police as a result of substance use, and inability to remember where one was or what one did after a night of substance use. Both inventories were coded to compare individuals who endorsed one or more of these items during the developmental period of interest (i.e., presence of one or more problems), to those who did not endorse any of the items during the developmental period (i.e., no problems).

Figure 1 presents descriptive statistics for high school dropout as a function of the school disengagement warning index. Figures 2, 3, 4 present descriptive statistics for the serious delinquency and problem substance use outcomes as a function of the school disengagement warning index in middle adolescence, late adolescence, and early adulthood.

Demographic Control Variables

Demographic variables include *child's age at baseline*, *gender*, *race and ethnicity* (African-American, Hispanic, or White), *mother's age at first birth* (a dichotomous variable that compares first birth at or before age 18 to first birth after age 18), *neighborhood arrest rate* (Rochester police data indicating the proportion of the total population in the family's census tract of residence at the beginning of the study that was arrested in 1986), *neighborhood proportion of families living in poverty in 1990* (standard census measure), *family structure* (comparing youth who lived with both biological parents to all other family constellations), *number of years of education for the primary caregiver*, and *family socioeconomic status* (a dichotomous variable indicating whether the primary caregiver was unemployed, the family received public assistance, or the family lived below the federally designated poverty level for a given family size).

Parental Control Variables

Parent measures include *delinquent values* (8-item scale asking how wrong it is to engage in a variety of delinquent acts, α=.92), *stress* (8-item scale assessing the respondent's perceptions of how well he or she was coping with life stress, α=.74), *attachment to child* (11-item scale adapted from Hudson's (1996) Index of Parenting Attitudes, α=.80), *monitoring of child* (7-item scale asking about such issues as how often the parent knows where the child is and who the child is with, α=.68), *consistent discipline of child* (5-item

scale measuring the extent to which parental discipline is appropriate and consistent, α=.63), and *conventional values for child* (5-item scale that inquires about the importance of prosocial goals and activities a parent has for his or her child, α=.80). All scales elicited Likert-type responses ranging from one to four and all control variables were measured at baseline.

Control Variables for Baseline Delinquency and Time

We also control for baseline (Wave 1) measures of the adolescents' delinquency (a 26-item index of general offending), official arrests and contacts with the police, and an indicator of alcohol or drug use. Finally, we also control for a measure of the amount of time that elapsed between the first and last survey for each developmental period.

Analysis

All models were tested using a probit regression model for a binary outcome in Mplus, Version 6.1 (Muthén & Muthén, 1998–2010). The weighted least squares mean- and variance-adjusted (WLSMV) estimator was utilized. In each model, the outcome variable of interest (i.e., high school dropout, serious violent crime, serious property crime, official arrest/police contact, problem alcohol use, and problem drug use) was regressed on the school disengagement warning index and all of the control variables listed in the measurement section. To examine high school dropout as a mediator of the relationship between the school disengagement warning index and early adult outcomes, we followed the protocol described by MacKinnon (2008). Using a probit regression model, we regressed high school dropout status on the school disengagement warning index and all controls. The probit regression coefficient relating high school dropout to the school disengagement warning index represents the "a" path in the mediation analysis—i.e., the predictor's effect on the mediator. Also using a probit regression model, we regressed each young adult outcome on high school dropout status, the school disengagement warning index, and the control variables. The probit regression coefficient relating each outcome to high school dropout represents the "b" path in the mediation model—i.e., the mediator predicting the outcome. The indirect effect is calculated as a*b. A categorical mediator is treated as a continuous latent response variable rather than an observed variable in Mplus with the WLSMV estimator. Significance tests for the indirect effect were calculated using bootstrapped standard errors.

Some students provided outcome data at some waves, but either attrited during the study or missed one or more waves of data collection. To appropriately handle missing data for these cases, we employed multiple imputation. The imputation was carried out using Mplus, Version 6.1 (Muthén & Muthén, 1998–2010). In total, 10 imputed datasets were created. All analyses were performed on each of the imputed datasets, and the parameter estimates were then combined using the procedures outlined by Rubin (1987).

Results

We begin by assessing the effect of the school disengagement warning index on high school dropout, as well as serious delinquency and problem substance use across middle

adolescence (ages 15–16), late adolescence (ages 17–18), and young adulthood (ages 21–23). In a series of probit regression models, these binary measures were regressed on the school disengagement warning index and the control variables described in the measurement section. For each model, a polynomial specification (up to the quadratic term, i.e., X and X^2) of the school disengagement warning index was assessed in order to determine if the index demonstrated a linear or curvilinear relationship with the probit transformation of each outcome. In these models, the linear and quadratic terms were centered at the mean (2.05). If the quadratic term was significantly different from zero ($p<.05$), it was retained, otherwise, it was dropped from the model. Only two models produced a significant quadratic term: serious violent crime in middle adolescence and problem alcohol use in early adulthood.

First consider the relationship between high school dropout and the school disengagement warning index. After adjusting for all control variables, the school disengagement warning index is positively associated with dropping out of high school ($b=.47$, $s.e.=.04$, $p<.05$). In other words, as a student accumulated more school disengagement risk indicators, the likelihood of dropping out of school dramatically increased.

Next consider the relationship between the school disengagement warning index and each of the delinquency and problem substance use outcomes holding constant all control variables. In middle adolescence, the school disengagement warning index is significantly and positively associated with serious violent crime (linear $b=.21$, $s.e.=.04$, $p<.05$; quadratic $b=-.06$, $s.e.=.02$, $p<.05$), serious property crime ($b=.14$, $s.e.=.05$, $p<.05$), official arrest/police contact ($b=.24$, $s.e.=.04$, $p<.05$), and problem drug use ($b=.22$, $s.e.=.08$, $p<.05$). The problem alcohol use measure was not significantly related to the school disengagement warning index ($b=.05$, $s.e.=.05$, NS). The significant polynomial effect for serious violent crime indicates that having more school risk indicators is associated with a higher likelihood of perpetration of serious violent crime, but the positive effect becomes somewhat weaker at higher levels of the school disengagement warning index. The school disengagement warning index is significantly and positively associated with each of the binary indicators of serious delinquency and problem substance use during late adolescence: serious violent crime ($b=.14$, $s.e.=.04$, $p<.05$), serious property crime ($b=.13$, $s.e.=.05$, $p<.05$), official arrest/police contact ($b=.21$, $s.e.=.04$, $p<.05$), problem alcohol use ($b=.18$, $s.e.=.04$, $p<.05$), and problem drug use ($b=.21$, $s.e.=.06$, $p<.05$). Finally, during early adulthood, the school disengagement warning index is significantly and positively associated with serious violent crime ($b=.15$, $s.e.=.05$, $p<.05$), official arrest/police contact ($b=.26$, $s.e.=.04$, $p<.05$), and problem drug use ($b=.16$, $s.e.=.05$, $p<.05$). The school disengagement warning index is also significantly and positively related to problem alcohol use in early adulthood, but the polynomial term is significant, indicating that the school disengagement warning index is related to the probit in a curvilinear fashion (linear $b=.04$, $s.e.=.04$, NS; quadratic $b=.06$, $s.e.=.02$, $p<.05$). Specifically, the relationship becomes more positive at high levels of the school disengagement warning index. The school disengagement warning index is not significantly associated with serious property crime in young adulthood ($b=.06$, $s.e.=.05$, NS). Taken together, these results indicate that the school disengagement warning index measured in middle school is indeed related to the majority of serious delinquency and

problem substance use outcomes throughout adolescence and into early adulthood after adjusting for a comprehensive set of control variables.

Finally, consider the extent to which high school dropout mediates (i.e., explains) the relationship between the school disengagement warning index and early adult problem behaviors. The results are presented in Figure 5. For all outcomes except serious property crime, the effect of high school dropout is statistically significant, indicating that, holding constant all controls and the school disengagement warning index, students who dropped out of high school were more likely to report involvement in serious delinquency and problem substance use. Moreover, significant mediation, the indirect effect (a*b) in Figure 5, is observed for all variables except serious property crime. High school dropout appears to be an important intermediary step in the process that links early school disengagement to problem behaviors in early adulthood. Specifically, earlier school disengagement is associated with subsequent dropout, which is in turn associated with serious problem behaviors in young adulthood.

Discussion

This study provides a better understanding of the development of school disengagement and its potential consequences. Academic underachievement is far too common in American society (Department of Education, 2010; Editorial Projects in Education Research Center, 2009) and has important negative consequences for the individual, his or her family, and society at large. Accordingly, attention recently has been paid to the development of early warning systems that identify youth at risk for dropping out of high school (Heppen & Bowles Therriault, 2008; Neild, Balfanz, & Herzog, 2007). Building on this work, we assessed the effects of a school disengagement warning index measured in 8th and 9th grade on serious delinquency and problem substance use during adolescence, prior to dropping out, as well as in early adulthood, after dropout had occurred. In doing so, we move our understanding of the consequences of school disengagement forward on several fronts. First, we examined indicators of school disengagement at earlier ages (during eighth and ninth grade) than has typically been analyzed in previous studies of long-term outcomes. Second, we controlled for a number of shared risk factors, including major demographic and family risk factors and baseline measures of delinquency and substance use. Third, for the early adult outcomes, we also examined the impact of school dropout status and whether or not it mediated the relationship between earlier school disengagement and the outcomes. Together, these strategies improve our knowledge of the link between school disengagement and problem behaviors.

Three core findings emerge from this analysis. First, our school disengagement warning index is a robust predictor of high school dropout. Importantly, this finding is maintained even after adjusting for a comprehensive set of shared risk factors. Second, school disengagement based on official school records has a sizable and significant direct effect on problem behaviors across the three developmental stages examined, even when important antecedent variables are controlled. The only exceptions are for problem alcohol use in middle adolescence and serious property crime during early adulthood. Third, for the early adult outcomes, dropout is a significant mediator of the effect of earlier school

disengagement on serious violent crime, official arrest/police contact, problem alcohol use, and problem drug use. These findings suggest that earlier school disengagement affects young adult problem behaviors via high school dropout. Taken together, these core findings add to the current literature on the long-term effects of school disengagement on problem behaviors.

This study does not test causal effects. Nevertheless, the objective measure of the school disengagement warning index used in this study, based on official school records, is a robust predictor of dropping out of high school and serious problem behaviors. The results corroborate previous findings and support our hypothesis. Based on these findings alone, however, we cannot determine if the school disengagement warning index is causally related to high school dropout, subsequent involvement in serious delinquency, and problem substance use. Although causal effects could not be ascertained, the results do suggest that school disengagement is a critical risk factor associated with these outcomes.

Before we consider the implications of these findings, it is important to recognize some of the study's limitations. First, although a comprehensive set of shared risk factors and potential confounding variables were included in the models, measures of other potentially important variables such as sensation seeking, impulsivity, and learning disabilities are not available in the data set. In addition, many of the outcomes considered in this study were self-reported by the individual. The study was also conducted in an urban school district and the extent to which its findings will replicate in suburban and rural school districts requires additional study. Despite these limitations, we believe that these findings make a substantial contribution to the existing literature.

This study's findings have important theoretical and policy implications. Theoretically, these results are quite consistent with developmental, life-course theories of antisocial behavior (e.g., Farrington, 2005). For example, Thornberry and Krohn's (2005) interactional theory offers a dynamic approach to understanding the long-term consequences of school disengagement that can cascade throughout an adolescent's life and carry into their adulthood. From a life-course perspective, school disengagement is seen as a trajectory that unfolds over time and movement along that trajectory is related to movement along other trajectories and age-graded transitions, such as a successful or unsuccessful transition to adulthood. Consistent with these expectations, we find that early school disengagement is strongly related to the likelihood of school dropout, as well as to movement along problem behavior trajectories of drug use and crime. In addition, the important role that dropout status plays in mediating the impact of early school disengagement on antisocial behaviors in early adulthood is consistent with the cascade model found in many life-course theories. Early disadvantage, here represented by school disengagement, can lead to later challenges such as failure to complete one of the major developmental tasks of adolescence—finishing one's high school education—with long-term negative consequences for the individual. Overall, findings are congruent with life-course theories.

In terms of policy, these results have important implications for the timing of interventions and for the appropriate targets of those interventions. As discussed earlier, previous research of the longer-term consequences of school disengagement has focused primarily on the

impact of school dropout. While that literature, as well as the current investigation, finds dropout status to be an important risk factor for subsequent problem behaviors, the present findings also indicate that one does not have to wait until the end of the school disengagement process to intervene. Indicators of school disengagement measured during eighth and ninth grade in this study are shown to be robustly related to school dropout and later involvement in crime and problem substance use. Thus, it seems prudent not to wait until students are dropping out, or have dropped out, of school to intervene. Students who evidence school risk factors, especially multiple school risk factors, during the middle school years are prime candidates for interventions designed to enhance school engagement. According, policy should strive to move interventions to an earlier stage.

Employing warning systems and moving up intervention strategies to enhance school engagement has several advantages. First, interventions would be targeting youth while they are still enrolled in school and therefore while it is easier to reach them and their families. Second, effective interventions offered to them will potentially have multiple positive impacts. For example, if effective, early interventions should reduce the likelihood of school dropout which is associated with numerous economic-, health- and crime-related consequences (Moretti, 2005; Muennig, 2005; Rouse, 2005; Waldfogel et al., 2005). Effective interventions also should reduce delinquency and substance use in the short term, as well as in the long term. A third important implication is related to the measure of school disengagement used here—our school disengagement warning index. It is based entirely on basic indicators—standardized test scores, attendance, grades, suspensions, and grade retention—that are almost universally found in official school records. Thus, it should be easy and economical for schools to create an early warning measure such as this to use as a screening device to identify youth at risk for school disengagement, dropout, and its subsequent consequences. Fourth, given that early warning systems have been in place for several years to identify students at risk for dropping out, the results of this study indicate that the identified youth are not just at risk for dropout, but also a host of other problem behaviors. The most effective interventions for these youth may be ones that target a wider variety of problem behaviors, as these youth appear to already be on a trajectory of serious delinquency and problem drug use as early as middle adolescence. In sum, the implementation of early warning systems and corresponding interventions should prove to be an efficient strategy for decreasing dropout and related problem behaviors both in the short and long term.

It is beyond the current investigation's reach to specify the appropriate content of intervention services. However, future research will need to, first, systematically investigate how early the school disengagement process begins and improve both its measurement and predictive accuracy. Doing so will then improve our understanding of the developmental pathways that lead from school disengagement to these and other outcomes so that effective, evidence-based programs can be developed and efficiently implemented with adolescents most at risk. Finally, the research reported here does not in any way diminish the importance of understanding the causes and consequences of dropping out of high school. School dropout is still related to subsequent problem behaviors and it is important to continue providing services to these adolescents to improve their life chances. At the same time, the core conclusion drawn from this research is that it is not necessary, and perhaps not wise, to

wait until dropout occurs to intervene. Ultimately, research on early warning systems and interventions may help youth avoid the long-term consequences of school disengagement that, as this study shows, has a substantial impact on problem behaviors, not only in adolescence, but also in young adulthood.

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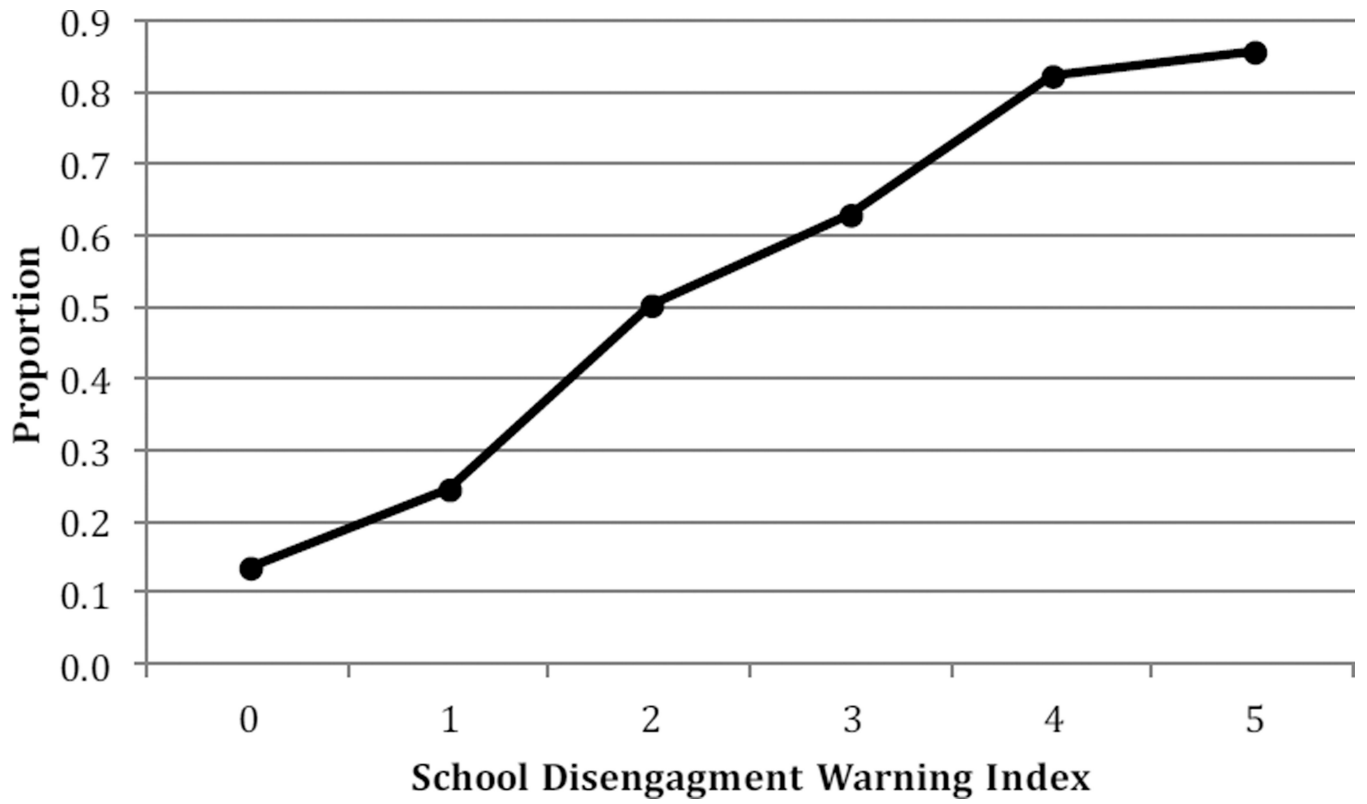
Figure 1.
Proportion of youth who dropped out of high school as a function of the school disengagement warning index
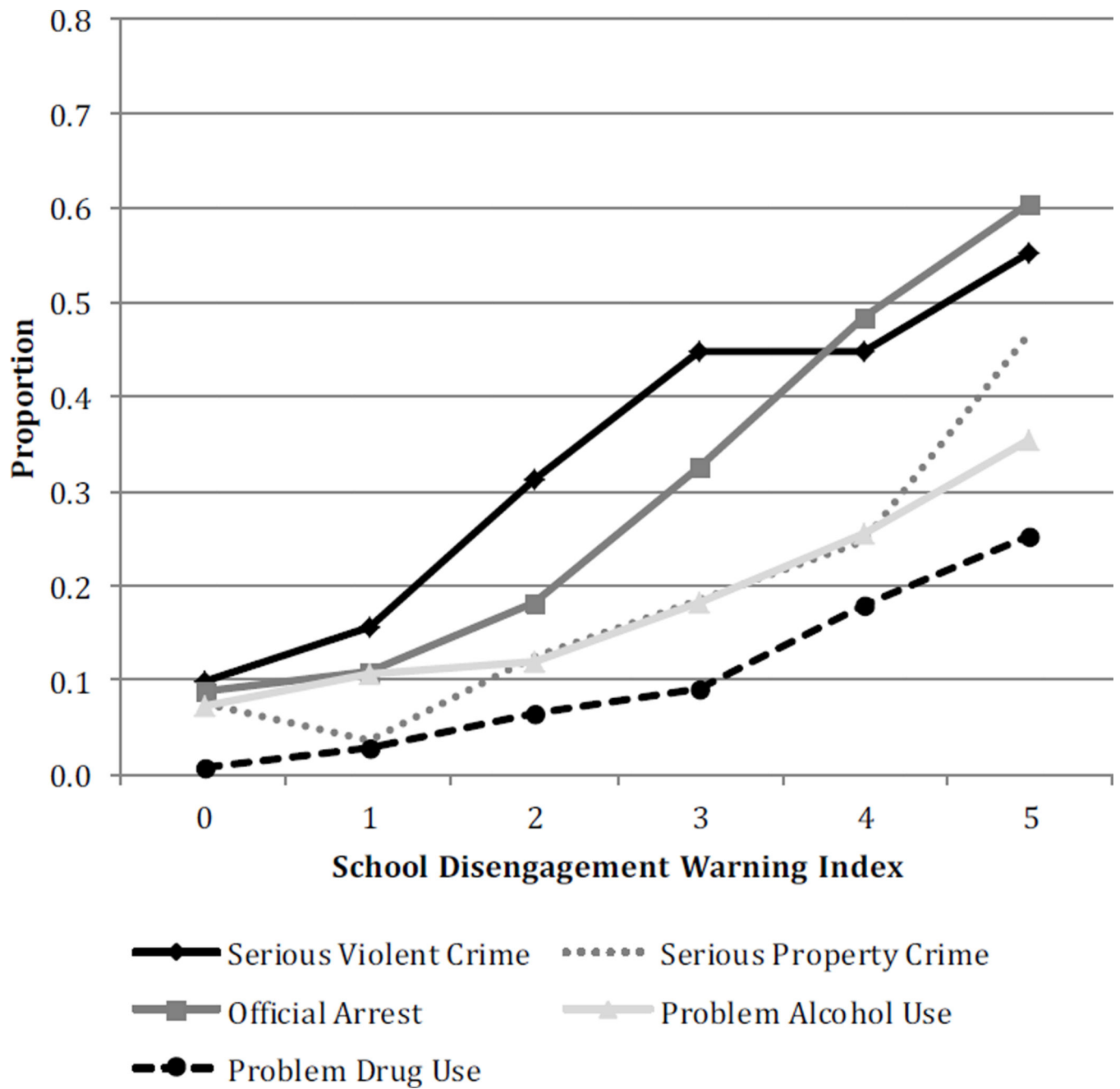
Figure 2.
Proportion of youth engaged in delinquency and problem substance use during middle
adolescence (ages 15–16) as a function of the school disengagement warning index
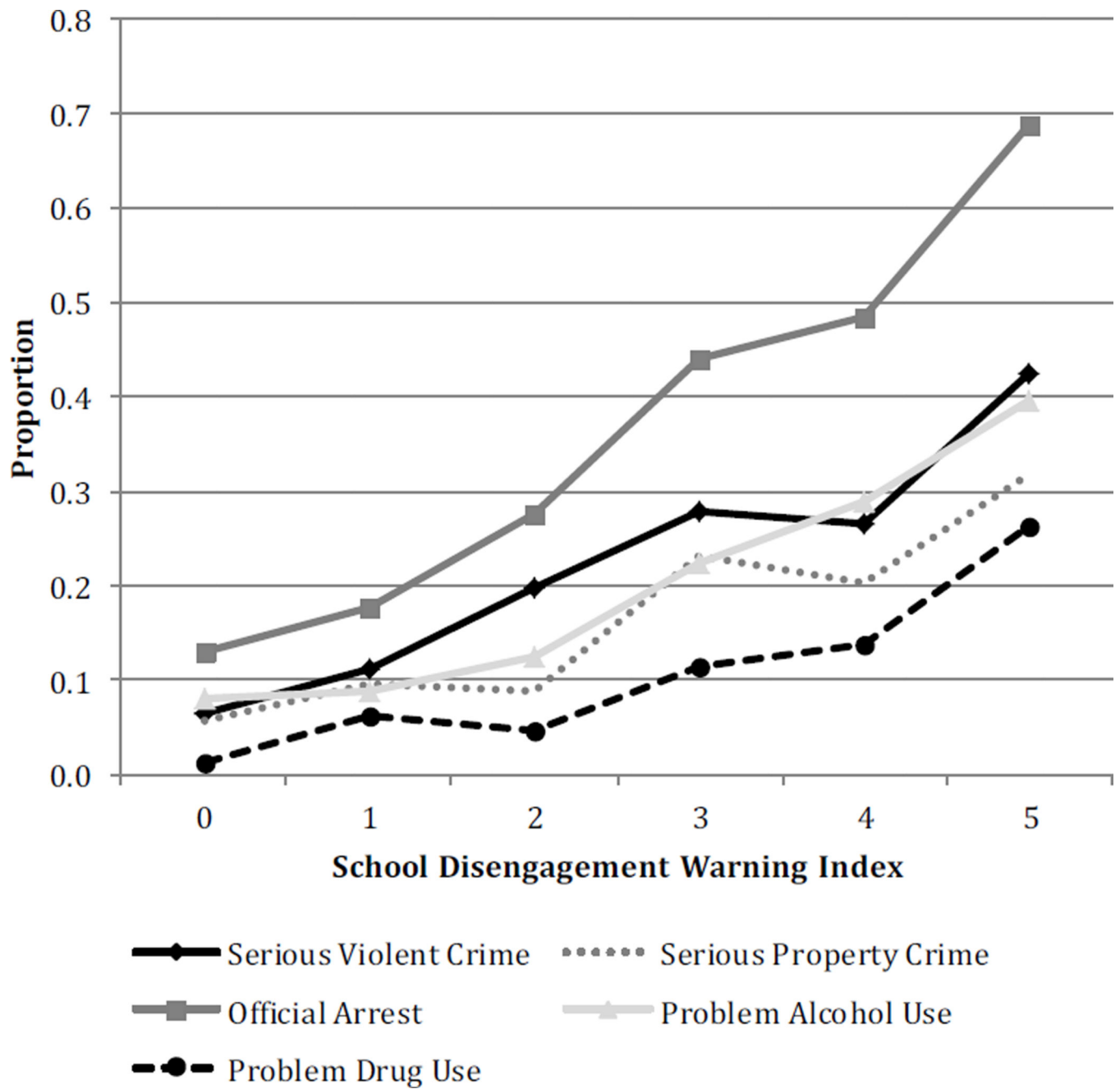
Figure 3.
Proportion of youth engaged in delinquency and problem substance use during late
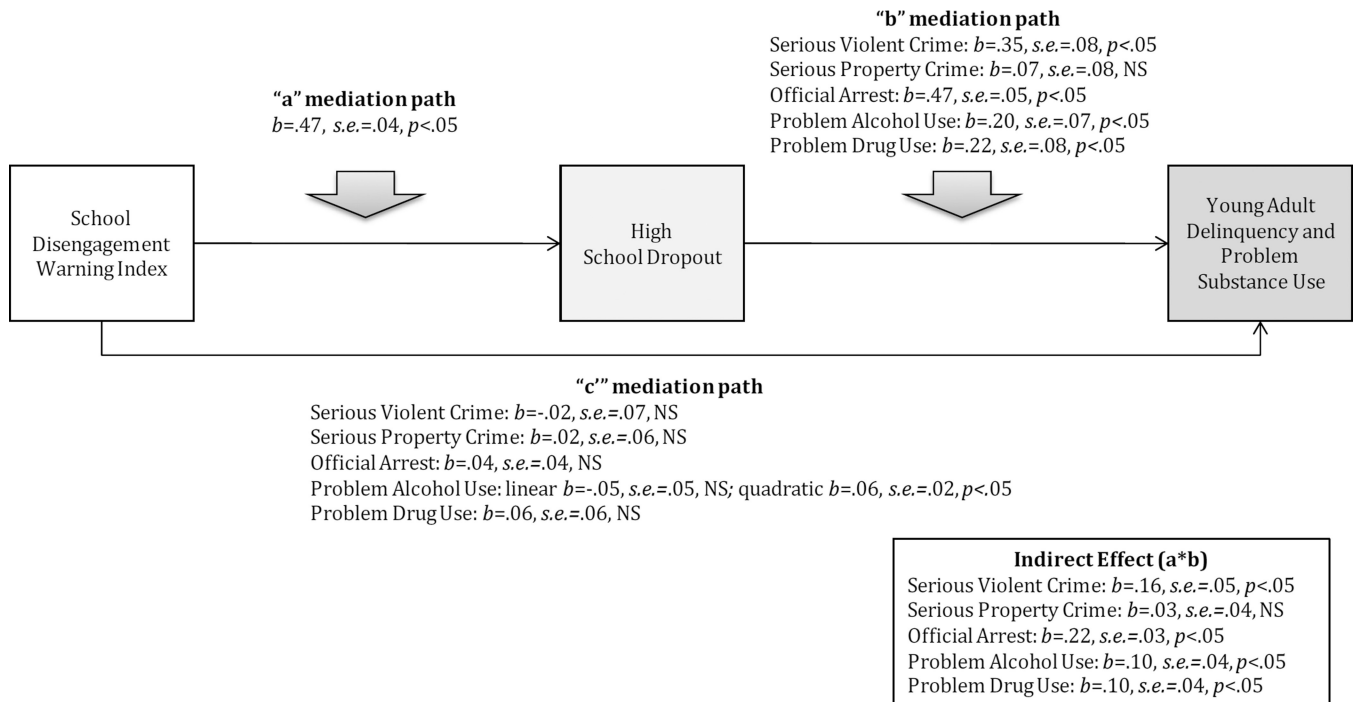adolescence (ages 17–18) as a function of the school disengagement warning index

Figure 4.
Proportion of youth engaged in delinquency and problem substance use during early
adulthood (ages 21–23) as a function of the school disengagement warning index

"b" mediation path
Serious Violent Crime: $b=.35$, $s.e.=.08$, $p<.05$
Serious Property Crime: $b=.07$, $s.e.=.08$, NS
Official Arrest: $b=.47$, $s.e.=.05$, $p<.05$
Problem Alcohol Use: $b=.20$, $s.e.=.07$, $p<.05$
Problem Drug Use: $b=.22$, $s.e.=.08$, $p<.05$

"a" mediation path
$b=.47$, $s.e.=.04$, $p<.05$

| School Disengagement Warning Index | → | High School Dropout | → | Young Adult Delinquency and Problem Substance Use |

"c'" mediation path
Serious Violent Crime: $b=-.02$, $s.e.=.07$, NS
Serious Property Crime: $b=.02$, $s.e.=.06$, NS
Official Arrest: $b=.04$, $s.e.=.04$, NS
Problem Alcohol Use: linear $b=-.05$, $s.e.=.05$, NS; quadratic $b=.06$, $s.e.=.02$, $p<.05$
Problem Drug Use: $b=.06$, $s.e.=.06$, NS

Indirect Effect (a*b)
Serious Violent Crime: $b=.16$, $s.e.=.05$, $p<.05$
Serious Property Crime: $b=.03$, $s.e.=.04$, NS
Official Arrest: $b=.22$, $s.e.=.03$, $p<.05$
Problem Alcohol Use: $b=.10$, $s.e.=.04$, $p<.05$
Problem Drug Use: $b=.10$, $s.e.=.04$, $p<.05$

Figure 5.
High school dropout as a mediator of the effect of the school disengagement warning index (measured in 8th and 9th grade) on problem behaviors in early adulthood (ages 21–23)