Growth in adolescent delinquency and alcohol use in relation to young adult crime, alcohol use disorders, and risky sex: a comparison of youth from low- versus middle-income backgrounds

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Abstract

Background—This study examined adolescent delinquency and alcohol use in relation to young adult crime, alcohol use disorders (AUDs), and risky sex. Analyses further examined the influences of late childhood involvement in these problem behavior outcomes, with mediation through teen delinquency and alcohol use, and examined differences in the pathways for youth from low- compared to middle-income backgrounds.

Method—Multiple-group latent growth curve modeling was conducted using data collected from a sample of 808 youth followed from age 10 to age 24. Self-report assessments included delinquent involvement, alcohol use, and sexual activity in late childhood; delinquency and alcohol use in adolescence; and crime, AUDs, and risky sex in early adulthood.

Results—Late childhood delinquent involvement was associated with young adult crime, AUDs, and risky sex indirectly through adolescent delinquency, and had a persistent direct effect on crime. Adolescent delinquency also mediated the relation between early sex onset and crime. Early alcohol use predicted a higher level of, and a faster rate of increase in, adolescent drinking, which predicted, in turn, young adult AUDs and risky sex. Significant group differences indicated stronger associations between adolescent delinquency and each young adult outcome for youth from low- compared to those from middle-income backgrounds.

Conclusions—Early intervention may help prevent the development of crime, AUDs, and risky sex behaviors, especially among disadvantaged youth.

Keywords

Alcohol abuse; delinquency; longitudinal studies; sexual behaviour; social class

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Adolescent delinquency and alcohol use are serious public health concerns. These problem behaviors are common and often co-occur (French & Maclean, 2006). Co-occurrence has been interpreted as providing evidence for a problem behavior propensity that explains involvement in both delinquency and alcohol use, and in other risk behaviors (Jessor & Jessor, 1977). However, research has shown that delinquency and alcohol use are related but distinct outcomes (White, Pandina, & LaGrange, 1987), with unique developmental trends

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and predictive interrelationships. For example, delinquency peaks in middle adolescence and declines gradually thereafter (Farrington, 1986), whereas alcohol consumption increases steadily throughout the teen years (Muthén & Muthén, 2000). There is a greater tendency for delinquency to predict alcohol use than the reverse (Windle, 1990).

Delinquency and alcohol use in adolescence also are linked to these respective problems in early adulthood. Adolescent delinquency increases risk for young adult crime (Simons, Stewart, Gordon, Conger, & Elder, 2002). Likewise, adolescent alcohol use increases risk for young adult alcohol use disorders (AUDs; Guo, Hawkins, Hill, & Abbott, 2001). Still, at least three gaps in our understanding of these linkages remain.

First, there is a need to examine associations of adolescent delinquency and alcohol use with young adult crime and AUDs, respectively, within the context of earlier delinquent involvement and alcohol use emerging prior to adolescence. Criminality and alcohol addiction are developmental phenomena with roots in early individual liabilities and social experiences (Patterson, DeBaryshe, & Ramsey, 1989; Tarter & Vanyukov, 1994). Early delinquent involvement and alcohol use, during the late elementary school years, are positive predictors of these respective outcomes in adolescence and early adulthood (Donovan, 2007; Fergusson, Horwood, & Ridder, 2005; Simons, Johnson, Conger, & Elder, 1998). However, the degree to which adolescent delinquency and alcohol use mediate the influences of childhood problem behaviors on young adult outcomes remains relatively unexplored.

If these behaviors unfold progressively (Chen & Kandel, 1995; Loeber & Hay, 1997), then adolescent problem behaviors may fully mediate the influences of early delinquent involvement and early alcohol use on young adult crime and AUDs, respectively. Alternatively, if childhood involvement in these behaviors marks an underlying vulnerability to subsequent problems (Moffitt, 1993; Patterson, Capaldi, & Bank, 1991; Tarter & Vanyukov, 1994), then early delinquent involvement and early alcohol use may have persistent influences on their respective young adult problem outcomes, over and above indirect influences through adolescent delinquency and alcohol use. This study tests these hypotheses with longitudinal data extending from late childhood to early adulthood.

Second, there is a need to better understand the general and specific patterns of prediction from adolescent delinquency and alcohol use to young adult crime and AUDs, as well as young adult risky sex behaviors. Arnett (2004) notes that the experience of a variety of romantic and sexual relationships is most common during the young adult years, 'when parental surveillance has diminished and there is as yet little normative pressure to enter marriage' (p. 10). Thus, sexual behavior takes on increasing significance during early adulthood, with associated health and emotional risks (Zahran, Zack, Vernon-Smiley, & Hertz, 2007). Like crime and AUDs, risky sex behaviors in early adulthood have developmental roots in earlier problem behaviors (Aalsma, Tong, Temkit, & Tu, 2008).

The consequences of delinquent behaviors are broad and long-lasting (Fergusson et al., 2005). As such, adolescent delinquency may increase risk not only for crime, but also for AUDs (Harford & Muthén, 2000) and risky sex (Aalsma et al., 2008). For example, as teens move into early adulthood, a delinquent orientation may manifest itself in new behaviors, such as having multiple sex partners or failing to adopt safe sex practices. Likewise, the young adult consequences of adolescent alcohol use may extend beyond AUDs (Duncan, Alpert, Duncan, & Hops, 1997). For instance, sexual enhancement expectancies and the pharmacological effects of alcohol may remove inhibitions and disrupt decision-making processes, thereby increasing risky sex activity (Dermen, Cooper, & Agocha, 1998; George & Stoner, 2000). However, findings regarding the effects of alcohol on sex behavior are

mixed, with significant prediction reported in some studies (Strachman, Impett, Henson, & Pentz, 2009; Stueve & O'Donnell, 2005) but not in others (Morrison et al., 2003). Similar mixed findings have been observed for associations between alcohol use and subsequent delinquency and crime (e.g., Duncan et al., 1997; Newcomb & Bentler, 1988). Thus, in contrast to the broad consequences of delinquency, the consequences of alcohol use may be linked primarily to alcohol-specific outcomes.

This study tests these hypotheses by examining changes in adolescent delinquency and alcohol use as predictors of young adult crime, AUDs, and risky sex, and as mediators of the long-term influences of early delinquent involvement, alcohol use, and sexual activity. Adolescent delinquency was expected to positively predict, broadly, all three young adult outcomes, whereas adolescent alcohol use was expected to positively predict, more specifically, AUDs. It was hypothesized further that influences of the childhood problem behaviors on young adult crime, AUDs, and risky sex would be at least partially mediated by teen delinquency and alcohol use. Primary analyses included gender as a covariate, and supplemental analyses explored possible gender moderation of the relationships under investigation. Although boys were expected to display higher levels of problem behaviors than girls, it was hypothesized that the patterns of prediction would be more similar than different across gender groups.

Third, there is a need to examine the role of socioeconomic background in the development and consequences of adolescent delinquency and alcohol use. Theory and research initially hypothesized strong links between socioeconomic status and adolescent problem behaviors; however, these links have been less robust than expected (for reviews, see Agnew, Matthews, Bucher, Welcher, & Keyes, 2008; Wiles et al., 2007). Findings from longitudinal studies are mixed, with low socioeconomic status sometimes increasing, sometimes decreasing, and sometimes being unrelated to risk behaviors (e.g., Cassewell, Stewart, Connolly, & Silva, 1991; Wright, Caspi, Moffitt, Miech, & Silva, 1999).

In light of mixed findings, we test three competing hypotheses about the potential moderating effect of income background on the relationships under investigation. One hypothesis is that positive associations of adolescent delinquency and alcohol use with young adult crime, AUDs, and risky sex will be stronger for youth from low-income backgrounds compared to those from middle-income backgrounds. Here, the assumption is that low-income youth lack access to resources and supports that may help buffer the negative consequences of adolescent delinquency and alcohol use (cf. Pampel & Rogers, 2004). An alternative hypothesis is that youth from middle-income backgrounds have more to lose in terms of social resources and capital; thus, their involvement in these problem behaviors will be more strongly linked to adverse long-term outcomes by making it difficult to return to adaptive functioning (e.g., Blaxter, 1990). A third hypothesis is that the predictive relationships represent general developmental processes that operate in the same manner for all youth, regardless of their income background, resulting in no differences across subgroups. To test these hypotheses, multiple group analyses of data collected from a diverse sample of youth are conducted.

Method

Sample

Data are from the Seattle Social Development Project (SSDP; Hawkins et al., 1997). In fall 1985, all fifth-grade students attending 18 elementary schools serving high-crime neighborhoods in Seattle were invited to participate. Of the 1053 eligible students, 808 (77%) were consented into the longitudinal study (M_{age} = 10.7 years, SD = .52). The sample is gender balanced (412 boys, 396 girls) and ethnically diverse: 47% Caucasian, 26%

African American, 22% Asian American, and 5% Native American. Slightly over half (51%) of the participants were from low-income households, based on participation in the National School Lunch and School Breakfast program. The median annual family income for the sample was $25,000 in 1985; 46% of parents reported an annual income under $20,000.

Analyses were based on data collected from participants in late childhood (age 10 – Grade 5), adolescence (ages 14, 15, 16 and 18 – Grades 8, 9, 10, and 12), and early adulthood (ages 21 and 24). Of those originally consented into the longitudinal study, 95% participated at age 24. Data collection and active informed consent/assent procedures were approved by the University of Washington's Human Subjects Division.

Measures

Childhood problem behaviors—*Early delinquent involvement* was measured with 8 self-report items at age 10, which asked about youths' frequency of involvement in behaviors such as vandalism, violence, and delinquent peer associations in the past year. A scale was created as the average response to these items (α = .61). At age 10, participants were asked 'Have you ever drunk beer, wine, whiskey, gin, or other liquor?' Responses were coded 1 for any *early alcohol use* and 0 for no such use. At age 14, participants were asked whether or not they had ever had sex and, if so, at what age. Responses were used to create an *early sex onset* variable coded 1 for sex onset at or before age 11 years and 0 for either sex onset after age 11 or no sexual activity.

Adolescent delinquency and alcohol use—*Delinquency* at ages 14, 15, 16, and 18 was measured with 5 self-report items assessing the number of times that youth reported engaging in behaviors such as vandalism and violence in the past year. Responses for each item were coded 0 (0 times), 1 (1 time), and 2 (2 or more times). At each time point, responses to the 5 items were averaged to compute a delinquency scale (average α = .61). *Alcohol use* at ages 14, 15, 16, and 18 was measured by asking 'How many times have you drunk beer, wine, wine coolers, whiskey, gin or other liquor in the past month?,' with the following response codes: 0 (0 times), 1 (1 time), and 2 (2 or more times).

Young adult outcomes—At ages 21 and 24, crime was assessed as the self-reported past-year frequency of involvement in 15 criminal acts (e.g., financial, property, and violent crimes). An overall measure of young adult *crime* was created as the mean of the variables at ages 21 and 24, and this measure was log transformed prior to analysis. Past year DSM-IV (American Psychiatric Association, 1994) alcohol abuse and dependence were assessed at ages 21 and 24 using a modified version (McGee et al., 1990) of the Diagnostic Interview Schedule (Robins, Helzer, Croughan, Williams, & Spitzer, 1981). A measure of young adult *alcohol use disorders* (AUDs) was created by assigning a 1 to those who met criteria for alcohol abuse and/or alcohol dependence at either age 21 or age 24 and a 0 to those who did not meet criteria for the disorders. At ages 21 and 24, 8 items asked about participants' relationship status, number of sex partners, and condom use in the past year. These items were combined to create a risky sex variable at each young adult time point that identified participants who reported having 3 or more sex partners and inconsistent condom use outside of a steady relationship in the past year. A measure of young adult *risky sex* was created by assigning a 1 to those who met criteria for risky sex at either age 21 or age 24 and a 0 to those who did not meet criteria for the outcome.

Demographic characteristics—*Income background* was measured based on participation in the National School Lunch and School Breakfast program at ages 10, 11, and 12 (1 = low-income background and 0 = middle-income or upper-income background;

because the sample was originally drawn from schools serving higher-crime neighborhoods in Seattle, almost no participating families would be characterized as upper income). Also, g*ender* (coded 1 for males and 0 for females) was a covariate in the analyses.

Analyses

Analyses were conducted using latent growth curve modeling (LGM) in Mplus 5.1 (Muthén & Muthén, 2009) with the weighted least squares means-variance (WLSMV) estimator. WLSMV estimation is appropriate for models with categorical outcomes, and it incorporates missing data procedures to maximize the use of available data. Model fit was evaluated using the Tucker–Lewis Index (TLI) and the root mean square error of approximation (RMSEA), with values above .95 and below .06, respectively, indicating acceptable fit (Hu & Bentler, 1999). Several steps were taken to ensure that the SSDP data, which were collected as part of a larger prevention trial, were appropriate for the current etiological analyses (e.g., an intervention covariate was unrelated to the outcomes, covariance similarities were observed across conditions).

Results

Descriptive statistics are presented in Table 1 for the total sample and for each income group. Youth from a low-income background had higher means on several measures of delinquency, and on the early-onset sex variable, compared to youth from a middle-income background. Regarding alcohol use, the sole statistically significant difference showed a higher level of early alcohol use among those from middle- compared to low-income backgrounds. There were no statistically significant group differences on the young adult outcomes.

Correlations among study variables are reported in Table 2 separately by income group. There were expected positive associations between the childhood problem behaviors and the indicators of adolescent delinquency and alcohol use, and the young adult outcomes. A somewhat larger number of statistically significant associations were observed among low-income compared to middle-income youth.

The primary analyses were conducted in 3 stages. First, separate LGMs for delinquency and alcohol use, along with a combined (dual process) model, examined patterns of change and interrelationships over time, from age 14 to age 18. Loadings of the intercept [1,1,1,1] and slope [0,1,2,4] factors were fixed at values that correspond to linear change, with intercepts set at age 14. Further analyses examined possible nonlinear change. Linear growth models were supported for both delinquency, χ^2 (5, $N = 800$) = 10.24, $p = .07$, TLI = .98, RMSEA = .04, and alcohol use, χ^2 (6, $N = 800$) = 9.69, $p = .14$, TLI = .99, RMSEA = .03. There was a significant average decrease in delinquency ($M = -.009$) and a significant average increase in alcohol use ($M = .155$), with significant variability about the means (delinquency slope variance = .004, $p < .05$; alcohol use slope variance = .037, $p < .05$). The dual process LGM displayed acceptable fit, χ^2 (15, $N = 800$) = 30.40, $p = .01$, TLI = .99, RMSEA = .04. Neither the predictive relationship between the delinquency intercept and the alcohol use slope nor that between the alcohol use intercept and the delinquency slope was statistically significant. Preliminary LGMs excluded covariates, which resulted in a loss of 8 cases; subsequent analyses used the full sample.

The second stage added predictors and outcomes to the dual process model. A conceptual illustration of the full LGM is depicted in Figure 1. Covariances among exogenous variables, and also among residuals of the outcomes, were freely estimated, as were covariances among residuals of the intercept factors and (separately) the slope factors.

Model fit was acceptable, χ^2 (31, $N = 808$) = 47.33, $p = .03$, TLI = .99, RMSEA = .03. Path estimates are reported in Table 3.

Early delinquent involvement and sex onset were associated with higher levels of middle-adolescent delinquency and alcohol use. Early alcohol use positively predicted a higher level of alcohol use in middle adolescence and a faster rate of increase in drinking thereafter, but was not associated with either the subsequent level or change in delinquency. Early delinquent involvement positively predicted young adult crime. Income background was not related to the outcomes. Middle-adolescent delinquency was associated with increased risk for each outcome. Predictive associations for alcohol use were more specific. For example, level of alcohol use in middle adolescence was positively related only to AUDs in early adulthood; however, growth in adolescent alcohol use was associated with increased risk for young adult risky sex in addition to AUDs. Gender had expected associations with the outcomes, with one exception: Male gender was associated negatively with age 14 alcohol use, reflecting the fact that girls ($M = .37$, $SD = .71$) in this sample reported a somewhat higher level of alcohol use than boys ($M = .35$, $SD = .68$) at this time. Tests of mediation through adolescent problem behaviors showed small but statistically significant ($p < .05$) indirect effects of early delinquent involvement on crime ($\beta = .09$), AUDs ($\beta = .08$), and risky sex ($\beta = .08$); early alcohol use on AUDs ($\beta = .08$); and early sex onset on crime ($\beta = .08$).

In the third stage of analysis, the full LGM (Figure 1) was estimated as a multiple-group model to test for differences in the path coefficients across income groups. Analyses began with a model that allowed all paths to vary freely across the two groups, which is similar to what would be obtained if separate models were conducted for each group, except the two groups were examined simultaneously in a single model. The fit of this unconstrained multiple-group LGM was acceptable, χ^2 (51, $N = 808$) = 78.33, $p = .01$, TLI = .98, RMSEA = .04. Next, a model was estimated that constrained to equality across groups all 44 structural (i.e., directional) paths. These constraints forced each estimated path coefficient (e.g., between early alcohol use and the alcohol use intercept) to take on the same value in both groups. A model comparison showed that these constraints contributed to a statistically significant decrease in fit compared to the unconstrained model, χ^2 (30, $N = 808$) = 46.95, $p = .03$, which indicates that some of the constrained path coefficients should be allowed to be different across groups. To systematically investigate which paths show group differences, modification indices from the constrained model were examined. Modification indices estimate the degree to which freeing a constrained parameter estimate will improve model fit; larger values suggest greater improvements to the fit of the model. The constraint on the path coefficient with the largest modification index was released and the model was re-estimated, comparing the new model fit with that of the unconstrained model. This process was repeated until a modified model with acceptable fit in comparison to the unconstrained model was obtained.

Constraints on 4 paths were released, resulting in a final model with some path coefficients that were forced to be the same and some that were allowed to vary across the two groups. This 'partially constrained' model had acceptable global fit, χ^2 (72, $N = 808$) = 108.82, $p = .00$, TLI = .98, RMSEA = .04, and it did not fit significantly worse than the unconstrained model, χ^2 (29, $N = 808$) = 42.77, $p = .05$. Thus, the partially constrained model was preferred because it struck the best balance between fit and parsimony. Three of the released constraints showed significant group differences in the (unstandardized) path estimates between the delinquency slope factor and young adult crime ($b = 2.69$, $p < .05$ for middle-income; $b = 3.44$, $p < .05$ for low-income), risky sex ($b = 2.54$, $p < .05$ for middle-income; $b = 3.89$, $p < .05$ for low-income), and AUDs ($b = 2.21$, $p < .05$ for middle-income; $b = 5.88$, $p < .05$ for low-income). The fourth released constraint revealed that gender had a statistically

significant positive association with the delinquency slope factor only for youth from a middle-income background ($b = .04$, $p < .05$ for middle-income; $b = .01$, $p > .05$ for low-income).

As a final consideration, additional multiple group analyses were conducted to explore gender differences in the associations depicted in Figure 1. Compared to an unconstrained model with path coefficients freely estimated across gender groups, a constrained model that forced each path estimate to take on the same value for boys and girls had significantly worse fit, χ^2 (22, $N = 808$) $= 57.38$, $p = .0001$, suggesting the presence of gender group differences. Modification indices revealed that the (unstandardized) paths of both early delinquent involvement ($b = .07$, $p < .05$ for girls; $b = .02$, $p < .05$ for boys) and early alcohol use ($b = .04$, $p < .05$ for girls; $b = .01$, $p > .05$ for boys) to the delinquency intercept were stronger for girls than boys. After the constraints on these two parameter estimates were released, the resultant model did not fit significantly worse than the unconstrained model, χ^2 (21, $N = 808$) $= 30.81$, $p = .08$.

Discussion

Drawing on longitudinal data spanning late childhood to early adulthood, the current analyses addressed three gaps in the literature by examining the development and consequences of growth in adolescent delinquency and alcohol use among a diverse sample of youth. First, delinquent involvement in late childhood positively predicted crime in early adulthood, both directly and indirectly through adolescent delinquency. This is consistent with research that has identified childhood delinquent behaviors as markers of risk for subsequent antisociality (Loeber & Hay, 1997; Moffitt, 1993; Patterson et al., 1991). The earlier such behaviors are initiated, the more difficult it is to resume a positive developmental trajectory. However, early delinquent involvement was not related to change in adolescent delinquency. It appears that youth with elevated delinquent involvement in late childhood (age 10) maintained high levels of delinquency in middle adolescence (age 14) and crime in early adulthood (ages 21 and 24), demonstrating the stability of antisocial behavior over time among youth with early emerging problems (Simons et al., 2002).

Early alcohol use was associated with a higher level of, and an accelerated increase in, adolescent alcohol use, both of which were associated, in turn, with elevated risk for young adult AUDs. This illustrates a developmental progression from early alcohol initiation to frequent and increasing alcohol use (as mediators) to problematic drinking (Chen & Kandel, 1995). Such a progression has been hypothesized to reflect the unfolding of an underlying, biologically based liability that increases risk for the development of alcoholism (Tarter & Vanyukov, 1994).

Second, results showed that delinquent involvement in late childhood was associated with higher levels of both delinquency and alcohol use in middle adolescence (Windle, 1990). Moreover, a high level of delinquency in adolescence positively predicted not only crime but also AUDs and risky sex in early adulthood, and change in adolescent delinquency was positively related to young adult crime and AUDs in the total sample. These findings illustrate the broad impact of delinquency on functioning in early adulthood (Fergusson et al., 2005), which may represent adverse consequences that accumulate over the life course.

The pattern of relationships for alcohol was more specific than that for delinquency; however, growth in adolescent alcohol use was associated positively with young adult risky sex. Drinking may facilitate risky sexual involvement, either through the expectation that it will enhance sexuality or through the pharmacological effects of alcohol (Dermen et al.,

1998; George & Stoner, 2000). A disinhibitory pattern, once established in adolescence, may extend into young adulthood.

Early-onset sexual behavior was associated directly with elevated levels of delinquency and alcohol use in middle adolescence and indirectly with young adult crime. These predictive associations might be explained by common causal influences (Jessor & Jessor, 1977); however, there is evidence that such associations persist when controlling for a range of background characteristics (Fergusson & Lynskey, 1996).

Third, multiple group analyses revealed four statistically significant income-group differences, three of which indicated that positive relationships between adolescent delinquency and young adult outcomes were stronger for youth from low- compared to those from middle-income backgrounds. It has been suggested that high socioeconomic status individuals may have more to lose from problem behaviors (e.g., Blaxter, 1990). By contrast, the current results indicate that low-income youth may experience greater harm from adolescent delinquency than high-income youth. It is possible that low-income youth lack access to resources that buffer middle- and high-income youth from the adverse consequences of problem behavior. As noted by Pampel and Rogers (2004), low-income individuals may experience a form of double jeopardy, in which socioeconomic disadvantage and problem behaviors synergistically increase risk for harmful outcomes.

Exploratory gender moderation analyses revealed more similarities than differences in the relationships under investigation. Two differences were observed, indicating that both early delinquent involvement and early alcohol use had stronger positive associations with the adolescent delinquency intercept for girls than boys. This is consistent with speculation that girls may be more vulnerable to the adverse consequences of early problem behaviors than boys (e.g., Nolen-Hoeksema, 2004); however, replication analyses are needed.

Findings should be interpreted in light of limitations. Participants were drawn from an urban area in the northwestern region of the United States, and results may not generalize to other populations. Assessments were collected using only self-report questionnaires, and some of the measures were coarsely categorized, potentially limiting the variability. Modification indices, which were used to systematically explore group differences in the associations, could have capitalized on chance differences in this sample; replications are called for. Moreover, additional studies based on an expanded consideration of the multiple dimensions of socioeconomic status are needed.

Because early delinquent involvement has broad and lasting consequences for subsequent functioning, early and sustained intervention efforts are needed to prevent the development of delinquency. Such interventions, if successful, may help prevent long-term problems in multiple domains of functioning (Boisjoli, Vitaro, Lacourse, & Barker, 2007). Findings also highlight the importance of delaying alcohol initiation, as well as targeting reduced adolescent alcohol use as a mediating process to interrupt pathways leading from early alcohol use to problem drinking (Spoth, Redmond, Shin, & Azevedo, 2004). Because both delinquency and risky sex are associated with drinking, interventions focused on preventing alcohol use might benefit from incorporating information about these other problem behaviors (e.g., by addressing sexual enhancement expectancies) into their curricula (Strachman et al., 2009). Youth from low-income backgrounds with early emerging problems may particularly benefit from screening and referral to targeted services that offer resources to help redirect antisocial developmental trajectories. [box]

Key points

Adolescent delinquency is known to have broad consequences for young adult crime, alcohol use disorders, and risky sex. This study found that these links were stronger for youth from low-income compared to those from middle-income backgrounds.

Childhood delinquent involvement positively predicted young adult crime, both directly and indirectly through adolescent delinquency.

Alcohol use displayed a progression from childhood initiation to frequent and increasing adolescent consumption, as mediating mechanisms, to young adult alcohol use disorders.

Effective early delinquency prevention may help prevent long-term problems in multiple domains of functioning, especially among disadvantaged youth. Delaying alcohol initiation and reducing adolescent alcohol use may help interrupt the progression to alcohol use disorders.

Acknowledgments

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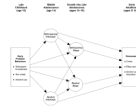**Figure 1.**
Conceptual illustration of the latent growth curve model examining childhood predictors and young adult outcomes of changes in adolescent delinquency and alcohol use. Covariates (not displayed) include gender and income background.

Table 1

Means and standard deviations for the study variables by low- and middle-income background

Variable	Total		Middle-income		Low-income		Middle vs. Low
	Mean	SD	Mean	SD	Mean	SD	
Gender	.51	.50	.54	.50	.48	.50	$\chi^2 = 2.27$ (1 df)
Early delinquent involvement	.21	.30	.18	.28	.25	.32	$t = -3.22^*$ (746 df)
Early-onset sex	.09	.29	.06	.24	.12	.32	$\chi^2 = 8.03^*$ (1 df)
Early alcohol use	.24	.43	.30	.46	.20	.40	$\chi^2 = 9.71^*$ (1 df)
Delinquency age 14	.20	.35	.20	.33	.21	.36	$t = .45$ (776 df)
Delinquency age 15	.20	.34	.17	.30	.22	.37	$t = -2.08^*$ (781 df)
Delinquency age 16	.19	.35	.17	.32	.22	.36	$t = 2.18^*$ (768 df)
Delinquency age 18	.17	.30	.17	.32	.17	.28	$t = .25$ (755 df)
Alcohol age 14	.36	.69	.33	.66	.38	.72	$t = -1.01$ (776 df)
Alcohol age 15	.43	.75	.40	.73	.47	.77	$t = -1.30$ (781 df)
Alcohol age 16	.51	.79	.50	.77	.51	.80	$t = -.32$ (768 df)
Alcohol age 18	.75	.90	.80	.91	.71	.90	$t = 1.38$ (755 df)
Crime	1.72	5.28	1.58	5.51	1.84	5.05	$t = -.67$ (784 df)
Risky sex	.23	.42	.25	.43	.23	.42	$\chi^2 = .26$ (1 df)
AUDs	.37	.48	.37	.48	.37	.48	$\chi^2 = .04$ (1 df)

Note.

*
$p < .05$.

Table 2

Correlations for youth from middle- ($n = 385$; upper-diagonal) and low- ($n = 423$; lower-diagonal) income backgrounds

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender (male)		.28*	.19*	.13*	.20*	.25*	.27*	.31*	.04	.00	.11*	.08	.21*	.32*	.33*
2. Early delinquent involvement	.10		.16*	.18*	.26*	.32*	.19*	.27*	.18*	.12*	.20*	.17*	.34*	.23*	.22*
3. Early sex onset	.30*	.07		−.02	.22*	.22*	.18*	.21*	.17*	.09	.05	.01	.06	.11	.13*
4. Early alcohol use	−.01	.16*	−.01		.11*	.12*	.04	.06	.11	.17*	.20*	.24*	.08	.22*	.09
5. Delinquency age 14	.14*	.20*	.35*	.05		.60*	.47*	.44*	.30*	.16*	.25*	.19*	.33*	.35*	.21*
6. Delinquency age 15	.17*	.20*	.33*	.04	.57*		.52*	.50*	.31*	.33*	.26*	.22*	.40*	.28*	.23*
7. Delinquency age 16	.23*	.19*	.26*	.05	.43*	.60*		.60*	.17*	.18*	.27*	.20*	.32*	.30*	.25*
8. Delinquency age 18	.18*	.15*	.13*	.03	.33*	.36*	.41*		.12*	.18*	.23*	.27*	.42*	.40*	.28*
9. Alcohol use age 14	−.07	.18*	.16*	.14*	.33*	.31*	.21*	.14*		.33*	.24*	.18*	.15*	.02	.09
10. Alcohol use age 15	−.01	.12*	.08	.09	.24*	.38*	.33*	.15*	.32*		.34*	.29*	.16*	.09	.15*
11. Alcohol use age 16	.01	.01	.06	.09	.19*	.23*	.35*	.16*	.28*	.43*		.39*	.17*	.28*	.19*
12. Alcohol use age 18	.09	.19*	.19*	.13*	.21*	.27*	.26*	.32*	.27*	.29*	.37*		.12*	.26*	.34*
13. Crime	.14*	.16*	.27*	.03	.16*	.21*	.29*	.18*	.05	.03	.08	.19*		.27*	.25*
14. Risky sex	.13*	.15*	.09	.12	.22*	.18*	.13*	.15*	.10	.07	.11	.27*	.20*		.48*
15. Alcohol use disorders	.24*	.13*	.08	.01	.14*	.19*	.18*	.35*	.10	.16*	.21*	.25*	.20*	.29*	

Note.

*
$p < .05$.

Table 3

Standardized (unstandardized) path coefficients for the total sample latent growth curve model ($N = 808$)

Predictor	Dlq. intercept	Alc. intercept	Dlq. slope	Alc. slope	Crime	Risky sex	AUDs
				Outcome			
Gender (male = 1; female = 0)	.10 (.06)*	−.12 (.18)*	.21 (.03)*	.13 (.05)*	.08 (.13)*	.14 (.29)*	.22 (.44)*
Income background (low = 1; middle = 0)	.02 (.01)	.06 (.09)	−.02 (.00)	−.10 (−.04)	.02 (.03)	.02 (.04)	.02 (.04)
Early delinquent involvement	.23 (.22)*	.19 (.48)*	.06 (.01)	.03 (.02)	.14 (.36)*	.07 (.24)	.07 (.22)
Early sex onset	.33 (.33)*	.20 (.51)*	−.05 (−.01)	−.05 (−.03)	.01 (.02)	−.02 (−.07)	.00 (.01)
Early alcohol use	.06 (.04)	.18 (.31)*	−.04 (−.01)	.14 (.06)*	−.02 (−.04)	.11 (.25)	−.06 (−.15)
Delinquency intercept	–	–	−.65 (−.15)*	.11 (.08)	.43 (1.22)*	.32 (1.12)*	.20 (.70)*
Alcohol use intercept	–	–	.09 (.01)	−.43 (−.11)*	.03 (.03)	.14 (.18)	.34 (.45)*
Delinquency slope	–	–	–	–	.23 (2.72)*	.10 (1.41)	.27 (4.05)*
Alcohol slope	–	–	–	–	.10 (.40)	.42 (2.17)*	.40 (2.06)*

Note.

*
$p < .05$. Dlq. = delinquency; Alc. = alcohol; AUDs = alcohol use disorders.