

Childhood Economic Strains in Predicting Substance Use in Emerging Adulthood: Mediation Effects of Youth Self-Control and Parenting Practices

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Objective To examine the influence of childhood economic strains on substance use in young adulthood and to assess the mediating roles of self-control as well as positive parenting during adolescence in a nationally representative longitudinal cohort. **Methods** The study included data from participants ($n = 1,285$) in the Panel Study of Income Dynamics, Child Development Supplement, and Transition to Adult. Structural equation modeling was used to evaluate the associations among risk factors during childhood and adolescence that predicted substance use in early adulthood. **Results** Conditions of economic strains, especially poverty, during childhood were associated with an increased likelihood of regular smoking in adulthood, which was partially mediated by poorer self-control during adolescence. **Conclusions** Self-control is negatively affected by economic strains and serves as a mediator between poverty and risk of regular smoking. Additional research is needed to better understand how economic strains effect the development of self-control.

Key words adolescents; alcohol use; drug abuse and exposure; parent stress; parenting; tobacco use.

Introduction

According to data from the current U.S. Census Bureau report (2011), the estimated percentage of children <18 years of age living in families whose income fell below the federal poverty line increased from 18% in 2000 to 22% in 2010 (DeNavas-Walt, Proctor, Smith, & U.S. Census Bureau, 2011). Childhood economic strains, which includes living below poverty threshold and having economic problems such as paying bills, have been linked with a number of negative outcomes in adolescence and also adulthood, including reduced health and well-being (Aber, Bennett, Conley, & Li, 1997; Bradley & Corwyn, 2002), lower academic performance (Duncan, Yeung, Brooks-Gunn, & Smith, 1998), increased risk of delinquency (Agnew, Matthews, Bucher, Welcher, & Keyes, 2008; Sampson & Laub, 1994), aggressive behaviors

(Moore, Gleib, Driscoll, Zaslow, & Redd, 2002; Najman et al., 2010), and psychopathology (Costello, Compton, Keeler, & Angold, 2003). Moreover, poverty and economic problems during early childhood are related to greater likelihood of substance use during transition to adulthood (Buu et al., 2009; Ensminger, Joun, & Fothergill, 2002; Najman et al., 2010). However, it is noteworthy that the direction of this association has been shown to differ depending on the type of substance use outcome being examined. For instance, lower household income during childhood and adolescence is associated with less alcohol and marijuana use, potentially owing to these substances being too expensive for poorer adolescents to purchase (Humensky, 2010; Substance Abuse and Mental Health Services Administration, 2003). Accordingly, clarifying the association between childhood economic strains and

each substance use outcome, as well as elucidating the observed link by individual characteristics during adolescence, is of high interest to researchers and policymakers as such research would highlight potential targets for intervention.

Two of the important individual characteristics, frequently mentioned in previous studies, related to substance use during adolescence and young adulthood, were self-control and parenting. A host of reports indicate that temperamental or personal traits such as poorer self-control are linked with a number of substance use problems, including adult substance dependence (Moffitt et al., 2011), poly-drug use, and alcohol-related problems (Patock-Peckham, Cheong, Balhorn, & Nagoshi, 2001; Vaughn, Beaver, DeLisi, Perron, & Schelbe, 2009). The positive relationship between individual self-control and substance use may be explained by deficient executive functioning, such as, difficulties in planning, decision making, and inhibitory control. These problems, therefore, could make children more vulnerable to risk-taking behaviors and substance use outcomes (see Brown, Tapert, Granholm, & Delis, 2000; Giancola & Tarter, 1999; Pharo, Sim, Graham, Gross, & Hayne, 2011; Wilens et al., 2010).

Differences in the ability for adolescents to exert self-control may be shaped by the family-environment (Wills & Dishion, 2004). To further illustrate this, developmental psychologists have proposed that poorer self-control is likely a product of limited learning resources and opportunities for developing appropriate capacities relevant to self-control (see Blair & Raver, 2012; Patel, Katz, Karssen, & Lyons, 2008). Overall, the influences of early experiences of economic strains on developmental progression to substance use may be clarified by better understanding the role of self-control and its antecedent, economic strains.

In addition to having a reciprocal relationship with self-control, positive parenting also plays an important role in explaining the link between economic strains and vulnerability to substance use during early adulthood. In general, various aspects of parenting have been demonstrated to be related to adolescent or adult substance use. Parental monitoring, for example, is associated with lower levels of substance use overall and lower levels of increase in use over time (Griffin, Botvin, Scheier, Diaz, & Miller, 2000). Parenting involving high nurturance and acceptance has been associated with a lower risk of substance use (see Rohner & Britner, 2002; Wills & Cleary, 1996). Conversely, the use of psychological control is associated with negative developmental outcomes in adolescence, including internalizing problems (Barber & Harmon, 2002), low self-esteem (Bean, Bush, McKenry, & Wilson, 2003;

Garber, Robinson, & Valentiner, 1997; Peterson, Southworth, & Peters, 1983), and greater substance abuse (Trzesniewski et al., 2006; Wild, Flisher, Bhana, & Lombard, 2008). Previous studies suggested that the substance use of offspring may be rooted in the absence of parental acceptance, less parental monitoring and/or excessive parental control over ones child's activities and behaviors (Barnes, Joseph, John, Michael, & Barbara, 2006; Taylor, Repettie, & Seeman, 1997).

There is a substantial body of literature that suggests that parents' ability to provide positive parenting strategies might be compromised by chronic stress resulting from poverty and economic problems (Conger, Ge, Elder, Lorenz, & Simons, 1994; Conger et al., 2002; Duncan, Ziol-Guest, & Kalil, 2010; Lempers, Clarklempers, & Simons, 1989; McLeod & Shanahan, 1993; McLoyd, Jayaratne, Ceballo, & Borquez, 1994; Sampson & Laub, 1994, Whitbeck et al., 1997). In other words, poverty and economic hardships reduce parents' responsiveness, warmth, and supervision, which in turn lead to substance use outcomes in their offspring such as drug use (Bailey, Hill, Oesterle, & Hawkins, 2009), problem drinking (Zucker, Donovan, Masten, Mattson, & Moss, 2008), and nicotine dependence (Chen et al., 2009). As a result, the conditions of economic strains may influence substance use behaviors via lack of positive parenting experienced by adolescents through their development.

Given that the prevalence of substance use disorders peaks during young adulthood (Arnett, 2005; Kessler, Berglund, Demler, Jin, & Walters, 2005), there is a demonstrable need to identify those at greatest risk for targeted prevention efforts prior to peak use. A number of studies have examined childhood economic strains, adolescent self-control, and parenting practices independently as predictors of subsequent adolescent and early adult substance use, but given the evidence noted above linking childhood poverty to both self-control and parenting, it is conceivable these factors may be in the pathway between childhood economic strains and substance use. In this study, we aimed to examine these factors as indirectly influencing three common substance use problems: Heavy alcohol use, marijuana use, and smoking. To our knowledge this is the first study to examine the indirect effects of both self-control and parenting in the pathway between early childhood economic strains and later substance use in early adulthood. We modeled the three substance use outcomes separately to examine the differential effect of the model on the various substance use outcomes.

A substantial literature indicates that preexisting differences in socio-demographic characteristics including age, gender, ethnicity, parental education level differences,

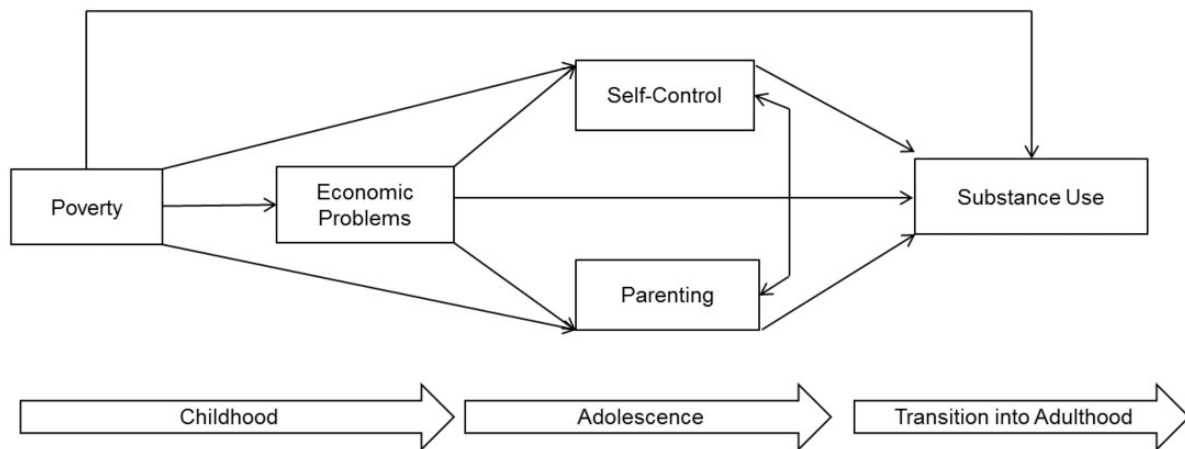


Figure 1. Proposed model of the present study.

and/or whether parents smoked or drank at home during their childhood are relevant to adolescent substance use (Biederman, Faraone, Feighner, & Monuteaux, 2000; Chen & Jacobson, 2012; Fawzy, Coombs, & Gerber, 1983; Redonnet, Chollet, Fombonne, Bowes, & Melchior, 2012; Stone, Becker, Huber, & Catalano, 2012; White, Johnson, & Buyske, 2000). Thus, controlling these socio-demographic differences among participants in this study is necessary to increase internal validity of examined relationships among economic strains, self-control, positive parenting, and substance. There are few studies showing that socio-demographic variables moderate the relationship between self-control and substance use or between parenting practices and substance use. However, given socio-demographic differences in substance use, it is also possible that socio-demographic subgroups may differ in their vulnerability to substance use across levels of self-control and positive parenting received during adolescence. That is, individuals in some socio-demographic subgroups may be more likely to use a certain substance than individuals in other socio-demographic subgroups at similar levels of self-control or received positive parenting. This study aimed to (1) examine the direct effect of childhood economic strains on substance use (i.e., regular smoking, heavy episodic drinking, and marijuana use) in young adulthood, (2) assess whether the relationships between childhood economic strains and young adult substance use was accounted for by self-control or positive parenting during adolescence, and (3) explore whether the mediator(s) between economic strains and substance use outcomes have similar influence for individuals from different socio-demographic groups (i.e., age, gender, ethnicity, parental education, and whether parents smoked or drank at home during their childhood). Figure 1 presents

the proposed model of the present study. In this model, economic strains experienced during childhood, including poverty and economic problems, are associated with inadequate self-control and deficient positive parenting during adolescence, which are believed to be associated with substance use later in adulthood.

Methods

Participants and Study Sample

Data for this study were drawn from the Child Development Supplement (CDS) and Transition to Adulthood (TA) surveys from the Panel Study of Income Dynamics (PSID) (McGonagle, Schoeni, Sastry, & Freedman, 2012). The PSID is a national representative sample of U.S. families, oversampled for low-income families. Data from these families and their offspring have been gathered since 1986. In 1997, children aged 0–12 years (up to two eligible children per household based on random selection) whose families were part of the PSID, were enrolled in CDS, and were reassessed during 2002–2003 and 2007–2008 as long as the children remained ≤ 18 years of age. Those that were > 18 years of age and were no longer enrolled in high schools had their information collected through the TA supplements in 2005, 2007, and 2009. In the current study, we limited our analysis to individuals with substance use data available during the TA. Additionally, one child from each family was randomly selected for the analysis for families that had more than one child in the study. The final analytic sample contains information from 1,285 children and their primary caregivers. Table I presents the timeline of the measures used in this study and Figure 2 displays a schematic representation of the flow by which participants were identified.

Table 1. Study Variables From Different Observational Years

Cohort	n	Age			1997	2001–2003	2005	2007	2009
		T1	T2	T3					
#1	547	10.78	15.98	18.96	Poverty/economic problems ^a	Self-control/parenting behaviors ^b	Substance use ^c	NA	NA
	345	8.59	13.78	18.74	Poverty/economic problems ^a	Self-control/parenting behaviors ^b	NA	Substance use ^c	NA
	236	6.95	12.13	19.12	Poverty/economic problems ^a	Self-control/parenting behaviors ^b	NA	NA	Substance use ^c
#2	157	10.77	15.71	17.72	NA	Poverty/economic problems ^a	NA	Self-control/ parenting behaviors ^b	Substance use ^c

Note. Variables that share a superscript were retrieved from the same data set.

^aPSID parental report.

^bCDS-parental-report for child behavior and child-report for parenting behaviors.

^cTA-child emerging-adults report. Age was self-reported by participants. Birth dates and interview dates varied between participants of this samples and due to interview date and DOB differences in this sample were varied, and therefore, differences in self-reported age between time points may not corresponding directly correspond to the intervals between collection years for each individual.

Measures

Substance Use During TA

Regular Smoking

Participants were asked whether or not they have ever smoked cigarettes. If a participant indicated that they have smoked cigarettes, they were then asked to specify if they currently smoke cigarettes regularly or occasionally. These questions were combined to one dichotomous variable, with those responding with either “did not ever smoke cigarettes” or “smoked occasionally” being classified as “non-regular smokers” and those who responded with “smoke cigarettes currently and regularly” being categorized as “regular smokers.”

Heavy Episodic Drinking

Conventionally, heavy episodic drinking was measured by consuming five (four for females) or more drinks on one occasion (Miller et al., 2004; Wechsler & Nelson, 2001). In the current study, participants were also asked to report the number of alcoholic drinks consumed on the days during which they drank within the past year. The raw responses ranged from 0 to 20, with the majority of participants reporting none. This item was dichotomized to the following groups “Less than five (four for females) drinks” and “five (four for females) drinks or more.”

Marijuana Use

To assess marijuana use, participants we asked to report the number of occasions they used marijuana during the past 12 months. Most individuals reported “no use”; thus, the responses for each question were dichotomized to groups of “non-users” and “users.”

Self-Control and Parenting During Adolescence

Self-Control

When the participants were adolescents, parents reported on a number of behavioral and emotional indicators of self-control. Behaviors were rated on a 3-point scale from “1 = not true” to “3 = often true.” Items were taken from the Behavioral Problem Index (BPI), originally developed by Achenbach and Edelbrock (1981) for use in the CDS surveys. From the BPI, the following 11 items consistent with the concept of self-control were selected: (1) restless or overly active, cannot sit still, (2) impulsive, (3) stubborn, sullen, or irritable, (4) disobedient, (5) cruel or mean to others, (6) argues too much, (7) has a strong temper and loses it easily, (8) cries too much, (9) has sudden changes in mood or feeling, (10) too dependent on others, and (11) has difficulty concentrating, cannot pay attention for long. The items included in this analysis are similar to those used to measure self-control in other studies (Nofziger, 2008). Cronbach’s alpha was .85 for items collected in 2002 and was .87 for items in 2007, indicating good internal consistency for each year. All items were coded so that higher summed scores reflected better self-control.

Positive Parenting

Positive parenting was assessed using three scales tapping different parenting dimensions: Parental acceptance, less parental psychological control, and parental monitoring. The details of each are described below.

Parental acceptance was measured by having adolescent participants answer four items adapted from Barber and Olsen’s (1997) Application of Child Report Behavior Inventory (Schaefer, 1965). Adolescent participants were

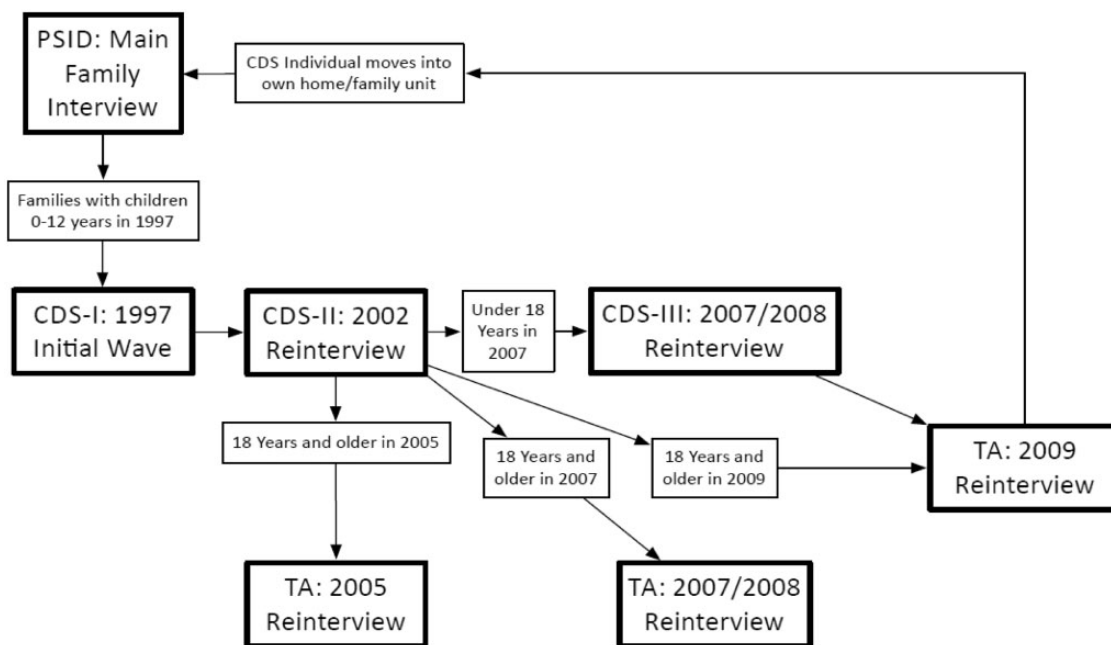


Figure 2. Study sample schematic. PSID = Panel Study of Income Dynamics. CDS = Child Development Supplement. TA = Transition to Adult.

asked to rate how well their mothers and fathers (1) enjoyed doing things with them, (2) cheered them up when they were sad, (3) gave them a lot of care and attention, and (4) often praised them. The response scale ranged from “1 = not like her or him” to “3 = a lot like her or him.” Cronbach’s alpha was .82 for items collected in 2002 and was .81 for items collected in 2007. Higher scores indicated greater acceptance received from parents.

Less parental psychological control was captured by asking adolescents to report how well each of five items adopted from the Psychological Control Scale-Youth (PCS-Y) Version (Barber, 1996) described their mothers and fathers. The CDS surveys only included a subset of the full PCS-Y, and therefore our assessment of parental control was limited to the following items: (1) my father/mother blamed other family members’ problems, (2) my father/mother changed the subject whenever they have something to say, (3) my father/mother brought up past mistakes when he/she criticized me, (4) my father/mother often interrupted me, and (5) if I hurt my father/mother’s feelings, he/she stopped talking to me until I please him/her again. Responses for these items were reverse coded, so responses became “1 = a lot like her or him” to “3 = not like her or him.” Cronbach’s alphas were .66 for items collected in both years. Higher scores indicated less psychological control by parents.

Parental monitoring conventionally was captured by child-report of parenting knowledge of child’s behaviors (e.g., Kerr & Stattin, 2000; Simons, Wu, Conger, & Lorenz, 1994). In current study, parenting monitoring was assessed using a modification of the Parental Monitoring Scale (PMS). This scale has demonstrated good predictive validity in previous research (Wen & Shenassa, 2012). Adolescents were asked to rate how knowledgeable their parents were regarding (1) how the child spends free time, (2) which friends the child hangs out with, (3) what the child spends money on, and (4) to what degree the child keeps secrets and hides information, with response options ranging from “1 = not at all” to “5 = a lot.” Cronbach’s alpha was .80 and was .84 for items collected in 2002 and 2007, respectively. Higher scores indicated higher levels of monitoring received by parents.

The correlation coefficients between acceptance and psychology control was .40, among acceptance and monitoring was .41, and among monitor and psychological control was .37, p all $< .01$. Exploratory factor analysis through *Mplus* indicated that the geomin rotated loadings are .66, .61, and .62. Eigenvalues for one factor was 1.79, two factors was .63, and third factor was .58. Accordingly these measures of parenting style dimensions fit better in one factor with .66 of variance of this single latent factor explained by the three parenting indicators. Accordingly, these items are used to form a latent construct of parenting style.

Economic Strains During Early Childhood

Poverty

Poverty was assessed by using annual family income, family size, and the number of children in the household, as reported in 1997 (for Cohort 1) or in 2001 (for Cohort 2). Annual family income was dichotomized by poverty thresholds according to the U.S. Census Bureau (1997) for the year that annual family income was reported. The threshold is determined by family size and the number of related children <18 years of age living in the home, with “1 = under or equal to the poverty threshold” and “0 = above the poverty threshold.” Details regarding the poverty threshold for the years 1997 and 2001 can be found at the following Web sites: <http://www.census.gov/hhes/www/poverty/data/threshld/thresh97.html>; <http://www.census.gov/hhes/www/poverty/data/threshld/thresh01.html>.

Economic Problems

Economic problems were assessed by asking primary caregivers, if, in the past year, the family had experienced any of 15 economic problems. The list of economic problems originated from the work of Conger and colleagues (1994). Some of the sample items included “sold possessions or cashed in life insurance,” “postponed medical care,” and “fell behind in paying bills.” Further details regarding this measure of economic hardship can be found elsewhere (Agnew et al., 2008). All items were summed to a single score with higher scores reflecting having experienced a greater number of problems.

Analysis

Structural equation modeling performed using *Mplus 7.0* (Muthén & Muthén, 1998–2010) was the primary method of inferential statistical analysis used in this study. All outcome variables of this study were binary, and therefore, weighted least squares parameter estimates (WLSMV) were applied. The criterion of goodness of fit indices for categorical outcomes were comparative fit index (CFI) >.95, Tucker Lewis index (TLI) >.95, root mean square error of approximation (RMSEA) <.06, and weighted root mean square residual (WRMR) <.90 (Honjo, Tsutsumi, Kawachi, & Kawakami, 2006). Based on our theoretical model, we also tested the mediation effect of self-control and parenting using the indirect (IND) command in *Mplus 7.0*. This method provides a significance test of the indirect or mediated effect with 95% confidence interval (CI) obtained through bootstrapping (bootstrapping = 2000). Given that the WLSMV output does not deliver *p*-values for the standardized coefficients, *p*-values from unstandardized coefficients were used to indicate

significance. Once the mediation effect was identified, we further explored whether the effect of the identified mediator is moderated by certain covariate.

Results

Descriptive Statistics

Table II provides the descriptive statistics of the studied variables. The racial/ethnic composition of participants was 44.1% Caucasian, 44.0% African–American, 6.8% Hispanic, 1.6% Asian, 0.4% Native American, and 2.9% other. Parents’ mean number of educational years was 13.45 [standard deviation (SD) = 2.47]. Approximately half of the adolescent participants were females ($n = 644$). Twenty-two percent of the participants reported

Table II. Descriptive Statistics for Study Variables

Variable	<i>n</i>	%
Female	644	50.1
Ethnicity		
White	567	44.1
Black	565	44.0
Hispanic	88	6.8
Asian	21	1.6
Native American	5	0.4
Other	37	2.9
Family income		
<\$25,000	276	21.5
\$25,000–\$40,000	270	21.0
\$40,000–\$65,000	273	21.2
≥\$65,000	281	21.9
Don’t Know/Refused	185	14.4
Poverty		
Above poverty threshold	895	69.6
≤Poverty threshold	198	15.4
No income this year/Don’t know/Refused	192	14.9
HW smoking/drinking	886	68.9
Regular smoking	169	13.2
Heavy episodic drinking	240	18.7
Marijuana use	349	27.2
	<i>M</i>	<i>SD</i>
Parental education (years)	13.45	2.47
Economic problems	1.68	1.84
# of Persons in the FU	4.24	1.25
# of Children in the FU	2.36	1.07
Parenting practices		
Acceptance	2.40	0.50
Control	2.45	0.45
Monitoring	3.80	0.84
Self-control	2.57	0.38

Note. FU = Full Household; HW Smoking/Drinking = Head and/or Wife smoked or drank.

an annual family income <\$25,000; 21.0% reported an income between \$25,000 and \$40,000; 21.2% earned between \$40,000 and \$65,000, and 21.9% reported an income of >\$65,000. Fifteen percent of households had a family income that fell below the poverty threshold (adjusted for family size and number of children <18 years old) according to the U.S. Census Bureau. The number of economic problems reported by participants' caregivers ranged from 0 to 8 with a mean of 1.68 ($SD = 1.84$). The prevalence of regular smoking, heavy episodic drinking, and marijuana use among these participants were 13.2, 18.7, and 27.2%, respectively.

Bivariate Correlations Between Studied Variables

The bivariate correlation matrix is presented in Table III. Both poverty and economic problems during childhood were associated with a greater likelihood of regular smoking ($r_{pb} = 0.09, p < .01$; $r_{pb} = 0.12, p < .01$, respectively), but less heavy episodic drinking and marijuana use (statistically significant only for poverty). Poverty and economic problems were associated with lower levels of self-control ($r_{pb} = -.13, p < .001$; $r_{pb} = -.16, p < .001$, respectively) and indications of poorer parenting, but these associations did not reach statistical significance. Greater self-control was associated with a lower likelihood of regular smoking, heavy drinking, and marijuana use ($r_{pb} = -.16, p < .001$; $r_{pb} = -.04, p = ns$, $r_{pb} = -.11, p < .01$, respectively). Indications of poorer parenting were also associated with a greater likelihood of taking one of the three substances.

Structural Equation Models

Figures 3–5 display the standardized estimates and corresponding standard errors of the path coefficients for each substance outcome. Results of the structural equation models indicated good fit of the data (Regular smoking

$X^2 = 51.85, p = .04, CFI = .98, TLI = 0.97, RMSEA = .02, WRMR = .72$; heavy drinking $X^2 = 52.42, p = .04, CFI = .98, TLI = 0.97, RMSEA = .02, WRMR = .72$; marijuana $X^2 = 51.85, p = .04, CFI = .98, TLI = 0.97, RMSEA = .02, WRMR = .72$).

For the model predicting regular smoking (see Figure 3), childhood poverty ($\gamma = .12, p < .05$), economic problems ($\beta = .18, p < .05$), self-control ($\beta = -.14, p < .001$), and parenting ($\beta = -.20, p < .01$) were all in the expected direction. In addition, poverty and economic problems were associated with adolescent self-control ($\gamma = -.10, p < .01$; $\beta = -.14, p < .001$), but not parenting ($\gamma = -.04, ns$; $\beta = -.08, ns$). The test of the relationship between economic problems and regular smoking via self-control was significant, while positive parenting held constant ($\beta = .06, p < .05$; 95% CI = .001–.018), suggesting self-control was a partial mediator between economic problems and regular smoking. However, the indirect effect from poverty and regular smoking through self-control did not reach statistical significance ($\beta = .05, p = .074$; 95% CI = -.002 to .037). Owing to self-control-control has demonstrated to have a partial mediation effect on regular smoking, we further evaluated the interaction effect between self-control and each covariate (i.e., age, gender, white versus non-white, parental education level, parent/caregiver alcohol and cigarette use) on regular smoking. The results indicated that there were no interaction effects.

For the model predicting heavy episodic drinking (see Figure 4), childhood poverty was associated with a protective effect on later heavy episodic drinking ($\gamma = -.15, p < .01$). As in the model above for regular smoking, parenting was not associated with poverty and economic problems, but was associated with heavy drinking ($\beta = -.22, p < .001$). The path from self-control to heavy drinking was moderately significant in an

Table III. Correlation Matrix of Studied Variables

Variables	Poverty ^a	Economic ^a problems	Self-control ^b	Acceptance ^b	Control ^b	Monitor ^b	Regular smoking ^b	Heavy episodic drinking ^b
Economic problems ^a	.191***							
Self-control ^b	-.127***	-.162***						
Acceptance ^b	-.024	-.074	.174**					
Control ^b	-.031	-.057	.219**	.400**				
Monitor ^b	-.019	-.070	.140**	.407**	.374**			
Regular smoking ^b	.090**	.115**	-.157***	-.087**	-.084**	-.114**		
Heavy episodic drinking ^b	-.158***	-.040	.021	-.036	-.045	-.083**	.138***	
Marijuana use ^b	-.073*	-.030	-.111**	-.110**	-.070*	-.173**	.387***	.347***

Note. ^aParental report.

^bChild report.

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

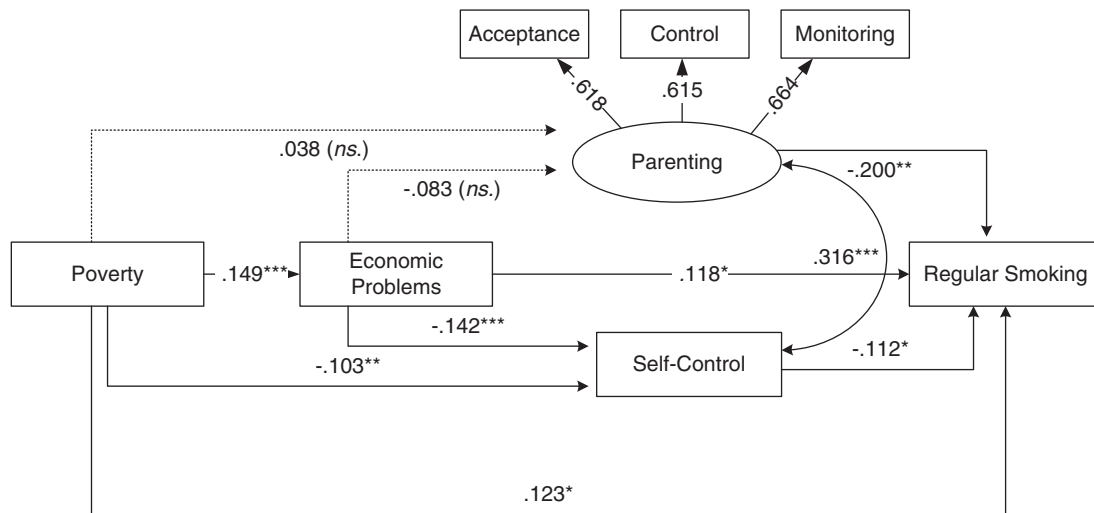


Figure 3. Effect of poverty and economic problems on regular smoking in early adulthood. Note. In structural equation modeling framework, circle variable characterizes latent variable, whereas square variables represent observable variables. $\chi^2_{(36)} = 49.06, p = .07$; RMSEA = .02 (90% CI = .00–.03); CFI = .99; TLI = .97; WRMR = .70.

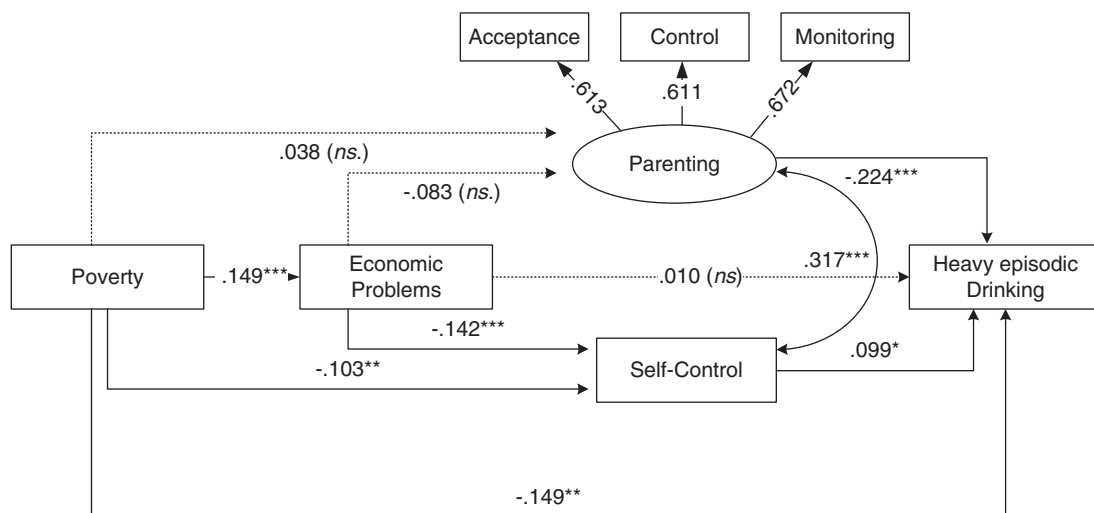


Figure 4. Effect of poverty and economic problems on heavy episodic drinking in early adulthood. In structural equation modeling framework, circle variable characterizes latent variable, whereas square variables represent observable variables. $\chi^2_{(36)} = 52.42, p = .04$; RMSEA = .02 (90% CI = .00–.03); CFI = .98; TLI = .97; WRMR = .72.

unanticipated direction, with higher levels of self-control associated with a greater likelihood of heavy drinking ($\beta = -.10, p < .05$). The test of the indirect effects between poverty and self-control and between self-control and heavy episodic drinking did not reach significant level either ($\beta = .004, p = .84$; 95 % CI = $-.068$ to $.009$).

In the marijuana use model (see Figure 5), neither childhood poverty nor economic problems had a significant association with marijuana use ($\gamma = -.05, ns, \beta = -.03, ns$, respectively). As in the other models, parenting was not associated with poverty and economic problems, but self-control was ($\beta = -.14, p < .001$). Positive

parenting behaviors were associated with a lower likelihood of marijuana use ($\beta = -.16, p < 0.01$) but self-control was not associated with marijuana use ($\beta = -.091, ns$). Because there was no direct effect from either poverty or economic problems on marijuana use, the hypothesized model did not support testing possible mediating effects of parenting or self-control on marijuana use.

Discussion

The present study examined the direct influences of childhood economic strains (i.e., poverty and economic

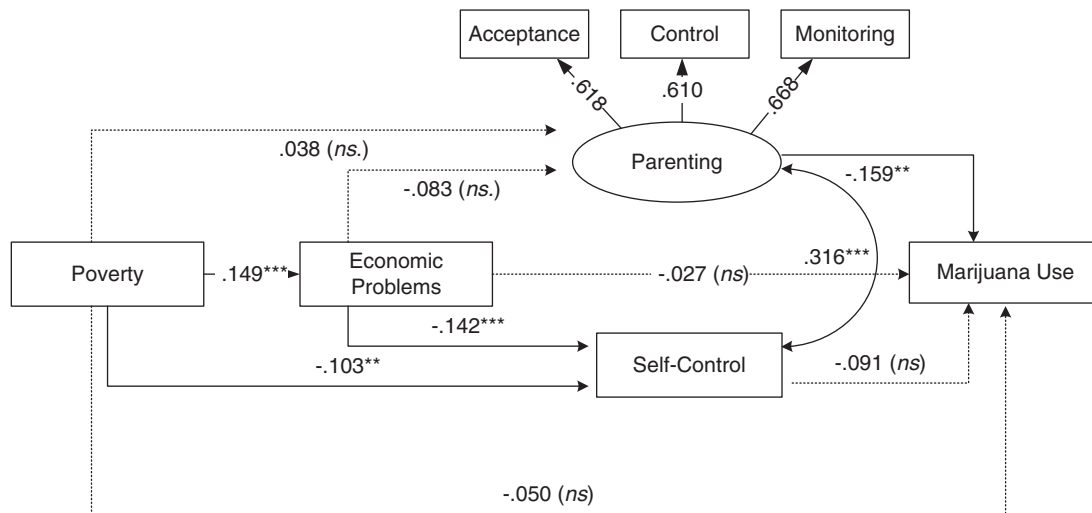


Figure 5. Effect of poverty and economic problems on marijuana use in early adulthood. Note. In structural equation modeling framework, circle variable characterizes latent variable, whereas square variables represent observable variables. $\chi^2_{(36)} = 51.85$, $p = .04$; RMSEA = .02 (90% CI = .00–.03); CFI = .98; TLI = .97; WRMR = .07.

problems) on regular smoking, heavy episodic drinking, and marijuana use as well as indirect effects via adolescent self-control and parenting during adolescence. The results highlight the extent to which early childhood economic strains can increase the risk of regular smoking in young adulthood. Positive parenting, that is, more acceptances, less psychological control, and high monitoring during adolescence predicted a lower likelihood of using substance overall, which implies that positive parenting during adolescence can protect youth from subsequent substance use. However, positive parenting during adolescence was independent from economic strains in childhood. This is an important finding suggesting that positive parenting is not necessarily diminished by earlier experiences of economic strains, and thus it does not serve as a mediator between economic strains and substance use outcomes. In support of our hypothesis, we did find that the link between early childhood poverty and risk for smoking in young adulthood was partially mediated by self-control, which means both direct effect of childhood poverty and indirect effect of childhood poverty through self-control were manifested. Children exposed to poverty at an early age were more likely to become regular smokers in their early adulthood, and this increased likelihood of smoking was largely attributable to poorer self-control during adolescence.

To our knowledge, this is one of the first studies to examine the prospective associations among childhood economic strains, adolescent self-control, positive parenting, and early adult substance use in a nationally representative population-based sample. Our findings are largely

consistent with the findings of previous studies. For example, our study supported that childhood economic strains, positive parenting received during adolescence, and youth self-control were all associated with substance use (Najman et al., 2010). Notably, though economic strains was positively associated with regular smoking, however, it was inversely correlated to the likelihood of heavy drinking, and unrelated to marijuana use. This is consistent with the notion that individuals with a lower socioeconomic status had a higher prevalence of cigarette use, but lower prevalence of alcohol use or other illicit drugs (Humensky, 2010; Substance Abuse and Mental Health Services Administration, 2003).

This present study also replicated findings of previous research in showing that higher levels of adolescent self-control are strongly related to a decreased risk of regular smoking and marijuana use (Wills & Dishion, 2004; Wills & Stoolmiller, 2002; Wills, Windle, & Cleary, 1998). In general, it is suggested that adolescents with poorer self-control are more likely to exhibit impulsiveness and sensation seeking behaviors, and therefore, may find greater reinforcement from drug use (King & Chassin, 2004). In agreement with other studies (Chapple, Hope, & Whiteford, 2005), our study found that there was an association between parenting and self-control, suggesting that positive parenting during adolescence may reduce the risk of substance use by facilitating adolescent self-control. However, these data do not allow for an evaluation of the reciprocal relations between positive parenting and self-control.

Because little is known about how childhood economic strains contribute to substance use during transition to adulthood, the purpose of this study was to evaluate the potential mechanisms between childhood economic strains and substance use during the transition to adulthood. Our results show that self-control is a partial mediator in the relationship between childhood economic strains and regular smoking. This not only aligns with the work of others but also places emphasis on the importance of the early childhood environment in shaping and developing self-control skills and abilities (Blair & Raver, 2012; Patel et al., 2008). In the context of the current study, it is possible that economic strains shape an individual's capacity for self-control in a couple of ways such as few opportunities for exercising executive functioning and self-regulation (Bremner & Vermetten, 2001; Powell, Lewis, Dunbar, Garcia-Finana, & Roberts, 2010). Findings from our study showed that there is a lack of variations between self-control and regular smoking across socio-demographic groups. Additional research is needed to replicate and to better understand the role of demographic differences on economic strains and self-control in the development of regular smoking.

Some findings herein were unexpected. First, poverty during childhood was found to be associated with less heavy episodic drinking. It might be that alcohol is too expensive for young adults who grew up with limited financial resources to spend on binge drinking (see Humensky, 2010). It would be interesting to know if this effect would remain as young adults reach better economic capacity and thus may have increased ability or opportunity to access and purchase alcohol more frequently. Additionally, greater self-control did not decrease the risk of heavy episodic drinking—in fact, it was associated with a slight increase in heavy drinking although the bivariate relationship between these two did not reach statistical significance. This inconsistency could be a “suppression” effect, suggesting that the variance of heavy episodic drinking explained by self-control was brought up at .05 level ($p = .045$) because the unrelated variance of self-control in predicting heavy episodic drinking was potentially removed by positive parenting and other demographic variables in this study. Regarding the marginal positive association between self-control and heavy episodic drinking, it could also be possible that at this age, heavy episodic drinking is viewed as a non-normative age-typical behavior (Chassin, Pitts, & Prost, 2002). As a result, such behavior may be less vulnerable to impulsive decision making or poorer self-control but more related to other factors, like peer pressure.

Several studies have published findings supporting the idea that less effective parenting (low acceptance, high psychological control, and low monitoring) may be a consequence of economic strains (Conger et al., 1994; Lempers et al., 1989). However, this was not supported in these data. In our study, positive parenting is a latent variable constructed by three parenting dimensions (i.e., acceptance, control, and monitoring). Though grouping different dimensions of parenting practices may mask the association of each parenting dimension with economic strains, this is less plausible in our case given that some of the dimensions of parenting were not significantly related to economic strains in the bivariate analysis. We, however, may have underestimated the relationship between economic strains and certain type(s) of positive parenting. Thus, the null relationship between economic strains and positive parenting should be interpreted within the context of the modeling decisions we made for this study.

There are a few limitations of this study that should be noted. Data for individual substance use was based solely on self-report. Various studies have found that individuals may underestimate their substance use, particularly heavy episodic drinking, when such use is perceived as a normative behavior during young adulthood. Also in PSID database, measures of substance use were limited in scope to regular smoking as well as heavy episodic drinking that would typically be considered as serious users rather than experimenters. Furthermore, because of low use of marijuana in this data set, this variable required being dichotomized for analysis. Future studies could benefit from measures that go beyond self-report such as assessing abuse and/or dependence diagnosis. Such data may have been particularly useful in better understanding the extent to which individual self-control influences problematic substance use rather than experimenting. It is also worth noticing that the measure of self-control was not specifically developed to capture this construct in the data set that we used in this current study, and thereby except for face validity, other validity evaluations were limited.

While the evidence from this study is derived from a longitudinal cohort with observed behaviors set in a theoretical-driven time order, causality cannot be determined. Given the limitation of cross-sectional approaches, a longitudinal prospective design is preferred to reveal likely causality among the plausible reciprocal relationships. Though we included a number of control variables (gender, race/ethnicity, parental education, and parental use of cigarettes and alcohol), other unmeasured factors which may be important confounders of substance use, such as peer smoking or depression, were not included in the analyses. Thus,

the results of this study should be interpreted with caution and in the context of the set of confounds included in the analysis. Finally, longitudinal sampling weights to adjust for the oversampling of individuals below the poverty level were not available, which may limit the generalizability of the findings to the US population.

Despite such limitations, the current study has a number of strengths. One is that, it is the first of its kind to identify self-control as a mediator between economic strains and substance use outcomes in a large, longitudinal, and prospectively collected cohort. The use of such a national-wide cohort also helps provide greater generalizability of the findings when compared with the results of other studies that used community-based samples. This cohort also contained an oversampling of low-income families, which allowed us to evaluate economic strains among a more diverse range of families within the United States. Additionally, the large sample size permitted an examination of serious substance use outcomes and their relationships with the hypothesized determinants. Finally, we were able to examine the mediation effects between childhood economic strains and substance use outcomes during the transition to adulthood. As our research indicated, the mediation hypothesis was particularly supported for regular smoking, but not for alcohol and marijuana use, indicating there is a need of examining substance use individually without grouping different substances together in one model when considering economic strains and poverty as determinants.

Conclusion

The findings of this study build upon existing knowledge by showing that self-control, previously shown to influence risk of substance use, is negatively affected by economic strains and serves as a mediator between economic strains and risk of substance use outcomes. The study highlights the importance of a life course or a developmental perspective for understanding the factors contributing to health behaviors in society. Poverty during childhood not only appears to affect child development, but can have lasting effects on the types of health choices made during adolescence and early adulthood. Minimizing the impact that economic strains on the development of poorer self-control may be a potentially fruitful drug prevention strategy, and an effort to which professionals can contribute. Ultimately, continued work is needed to better understand the mechanisms through which economic strains may influence the development of self-control, as well as to identify other

potential mediators between economic strains and substance use outcomes.

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