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Family Income Trajectory during Childhood Is Associated With Adolescent Cigarette Smoking And Alcohol Use

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Abstract

Background—Although childhood socioeconomic disadvantage has been linked with adolescent tobacco and alcohol use in cross-sectional research, less is known about the influence of changes in socioeconomic status during childhood. Upward socioeconomic mobility may attenuate the negative influence of earlier socioeconomic disadvantage on health, while downward mobility may counter the health benefits of earlier socioeconomic advantage. This study evaluated the influence of common trajectories of family income during childhood on smoking and alcohol use during adolescence.

Methods—Data utilized were part of the 15-year longitudinal Study of Early Child Care and Youth Development. A 5-class trajectory model (two stable, one downward, and two upward income trajectories) was developed previously with this sample ($N = 1356$). Logistic regression analyses were conducted to determine whether children of the more disadvantaged income trajectories were more likely to engage in tobacco and alcohol use at age 15 relative to those of the most advantaged trajectory.

Results—Family income trajectory was significantly associated with ever-smoking ($p = .02$) and past-year alcohol use at age 15 years ($p = .008$). Children from the less advantaged trajectories

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were more likely to have ever-smoked than children of the most advantaged trajectory (all p 's < .05). Children of the downwardly mobile trajectory were more likely to have used alcohol within the past year than children of the most advantaged trajectories as well as the most disadvantaged trajectory (all p 's < .05).

Conclusions—Findings indicate that childhood socioeconomic disadvantage influences adolescent smoking, while downward socioeconomic mobility influences adolescent alcohol use.

1. INTRODUCTION

The prevalence of alcohol and tobacco use among adolescents is alarmingly high. Recent estimates from the Youth Risk Behavior Surveillance System (YRBSS) indicate that 44.7% of high school students have ever-smoked and 18.1% have smoked within the past 30 days (Eaton, et al., 2012). Further, 70.8% of students have ever consumed alcohol, and 38.7% reported alcohol use in the past 30 days (Eaton, et al., 2012). Most adults who smoke report initiating smoking prior to 18 years of age (CDC, 2013), and those who began drinking in early adolescence have the greatest risk of developing alcohol use disorders in adulthood (DeWit, Adlaf, Offord, & Ogborne, 2000). Tobacco- and alcohol-attributable deaths are among the leading causes of mortality in the U.S. (Mokdad, Marks, Stroup, & Gerberding, 2004). Tobacco and alcohol use are also associated with numerous other negative consequences, including risky sexual behavior, early pregnancy, illicit drug use/activities and violent criminal activities (Ellickson, Tucker, & Klein, 2001; Ellickson, Tucker, & Klein, 2003; Stueve & O'Donnell, 2005).

Socioeconomic status (SES) during childhood is associated with substance use in adolescence (for a review, see Hanson & Chen, 2007). SES includes an individual's economic, social, and work status, which together reflect a broader dimension of social stratification. The most commonly measured indicators of SES include income, education, and occupation (Adler, et al., 1994). Childhood socioeconomic status is commonly represented by either or both parent's income, education, or occupation (see Hanson & Chen, 2007). General models describing the influence of childhood socioeconomic disadvantage on adult health focus on the harmful physical and psychosocial environmental exposures (e.g., risky/unstable families, neighborhood crime/violence, poor quality education, crowding) associated with socioeconomic disadvantage. In turn, these exposures are hypothesized to have a negative influence on psychological (e.g., increased stress/negative affect), behavioral (e.g., substance use, poor diet, insufficient physical activity), and physiological outcomes (e.g., altered cortical development) which may adversely impact adult health (see conceptual model in Cohen, Janicki-Deverts, Chen, & Matthews, 2010).

Additional research suggests several pathways through which SES may influence substance use specifically. Fergusson et al. (2007) reported that childhood socioeconomic disadvantage was associated with smoking later in life via several pathways, including cognitive/educational factors, behavioral factors, and parental or peer smoking. Consistent with the concept of observational learning in Social Cognitive Theory (Bandura, 1986), socioeconomically disadvantaged children are more likely to initiate and develop smoking habits when they spend time in an environment where others around them smoke (e.g.,

parental and peer role models; Fergusson & Horwood, 1999; Green, MacIntyre, West, & Ecob, 1991). In addition, lower intellectual ability, underachievement in school, misbehavior and conduct problems are linked with both socioeconomic disadvantage in children (Teasdale & Owen, 1986; Tuvblad, Grann, & Lichtenstein, 2006) and smoking (Feinstein & Bynner, 2004; Kubiśka, Matjck, Dytrych, & Roth, 2001; Lynskey & Fergusson, 1995).

Less is known about how the timing of the exposure to socioeconomic disadvantage or changes in SES over time might influence substance use. Several theories including the critical/sensitive period, accumulation/cumulative exposure, and social mobility models attempt to explain how childhood socioeconomic disadvantage might influence health outcomes later in life (for reviews, see Cohen, et al., 2010; Hallqvist, Lynch, Bartley, Lang, & Blane, 2004; Pollitt, Rose, & Kaufman, 2005). In the critical/sensitive period model, SES is hypothesized to have the greatest impact on health during specific developmental stages (e.g., early vs. late childhood). For example, Poulton et al. (2002) showed that those who experienced socioeconomic disadvantage during early childhood were more likely to develop alcohol dependence by age 26, regardless of adult socioeconomic position or infant health status. The accumulation model hypothesizes that the effects of exposure to socioeconomic disadvantage accumulate over time to increase the risk of poor health at later stages in life. For example, Mossakowski (2008) showed that longer durations of poverty and unemployment over a span of 13 years were independently and significantly correlated with heavy and frequent drinking later in adulthood, even after controlling for demographic variables, prior heavy drinking, and current socioeconomic status. Likewise, cumulative childhood socioeconomic disadvantage from birth to 16 years has been shown to be significantly associated with persistent smoking in later life (Jefferis, Power, Graham, & Manor, 2004). However, the concept of social mobility has been relatively understudied, wherein the negative effects of earlier socioeconomic disadvantage are hypothesized to diminish when an individual experiences upward socioeconomic mobility, while the benefits of earlier socioeconomic advantage on health are attenuated by downward socioeconomic mobility.

The purpose of the current study was to evaluate the influence of common trajectories of childhood family income on cigarette smoking and alcohol use during adolescence. It was hypothesized that children who experienced low income throughout childhood would be more likely to engage in tobacco and alcohol use at age 15 than those who experienced higher incomes throughout childhood. Children who experienced upward social mobility were expected to have outcomes consistent with a reduced likelihood of tobacco and alcohol use relative to children with consistently low SES, while those who experienced downward economic mobility were expected to have outcomes consistent with a greater likelihood of tobacco and alcohol use relative to children with consistently high SES.

2. METHODS

2.1 Study design and participants

The Study of Early Child Care and Youth Development (SECCYD) was a longitudinal study designed to examine the influence of child care experiences on social, emotional, intellectual, and language development; as well as physical growth and health of children

(for more information, see NICHD, 2012; NICHD ECCRN, 1994). Participants were enrolled at 10 sites across the U.S., and they were followed through four phases starting at the birth of the child and continuing through 15 years of age. Following the birth of their child, mothers were asked about their interest in being contacted to participate in the study. Mothers and their children were later contacted and enrolled in the study during a home visit when the child was 1 month of age.

A total of 1,364 families were enrolled in Phase 1 in 1991, which continued from birth to 3 years of age and included assessments at 1, 6, 15, 24, and 36 months of age. During Phase 2, 1,226 families (89.9%) were retained in the study. Phase 2 continued from 54 months through 1st grade, and included assessments at 54 months, kindergarten, and 1st grade. During Phase 3, 1,061 families (77.8%) remained in the study. Phase 3 included assessments at 2nd, 3rd, 4th, 5th, and 6th grades. By Phase 4, 1,009 families (74.0%) remained in the study. Phase 4 included assessments at 7th and 8th grades and at age 15 years. Data were collected by research assistants via home visits, visits to the children's various forms of child care, visits to a laboratory playroom, visits to schools, telephone calls, and mailed questionnaires to the children's parents and teachers. All study procedures were approved at the institutional review boards of each site, and informed consent was obtained from all participants at the beginning of each phase of the study. Information about inclusion/exclusion criteria, recruitment, enrollment, and the study protocol are presented in detail elsewhere (NICHD, 2012; NICHD ECCRN, 1994).

2.2. Measures

2.2.1. Demographics/Socioeconomic Status—Given that only 23.7% of the sample was of non-white race/ethnicity (i.e., 12.8% Black, 6.0% Latino/Hispanic, 1.4% Asian/Pacific Islander, 0.2% American Indian/Eskimo/Aleut, 3.3% other), race/ethnicity was dichotomized into White/Caucasian and non-White categories in all analyses. Maternal age and years of education were measured when the infant was 1 month of age. Income-to-needs ratio was calculated by dividing the self-reported total family income by the federal poverty threshold for that year given the size of the family (e.g., the poverty threshold for a family of four in 1991 was \$13,924; see Census, 2010). Thus, an income-to-needs ratio of 1.0 indicates that the family was living at the poverty threshold. Given the low frequency of individuals living at or below the poverty threshold in the current sample, the income-to-needs ratio was dichotomized into low income (income-to needs ratio ≤ 2) or adequate income (income-to needs ratio > 2). This cut-point for low-income (i.e., 200% of the poverty threshold) was chosen because it has been used in previous research with the SECCYD data set (e.g., Nader, Bradley, Houts, McRitchie, & O'Brien, 2008; Nader, et al., 2006) and often serves as a criterion for qualifying for government aid [e.g., Child Health Insurance Program (CHIP)]. Income was measured at 13 assessment points beginning at 1 month of age and continuing through 15 years of age [i.e., 1, 6, 15, 24, and 36 months (phase 1); 54 months, kindergarten, and grade 1 (phase 2); grades 3-6 (phase 3); and 15 years of age (phase 4)]. All demographic and socioeconomic status data were collected via interview (through the 54 month assessment) or questionnaire (from kindergarten through age 15 assessments) either in the participant's home or in the laboratory.

2.2.2. Cigarette/Alcohol Use—Smoking during the past year and ever-smoking (yes or no) were measured at age 15. In addition, participants were asked how many cigarettes they had smoked in their lifetimes and given the following response options: None, 1 or 2, 3-10, 11-20, and >20 cigarettes. Alcohol use during the past year (yes or no) was assessed at age 15. Note that level of alcohol use and ever-drinking (alcohol) were not measured in the current study. An additional variable was created to reflect the combination of both smoking and alcohol use during the past year (yes or no). Maternal ever-smoking and ever-drinking (yes or no) were measured when the child was 15 years of age.

2.3. Analysis Plan

2.3.1. Latent Class Growth Analysis—Mplus software version 5.21 was utilized to conduct a Latent Class Growth Analysis (LCGA). The purpose of the LCGA was to characterize the optimal number of trajectories of family income over time from 1 month to 15 years of age. The LCGA included a total of 1356 participants, as 8 participants did not provide income data at any of the 13 possible measurement points. A detailed description of these analyses has been presented elsewhere, along with a graph of the proportion of low income households by trajectory at each age (see Kendzor, Caughy, & Owen, 2012). Findings supported a 5-class model which included the following classes: 1) a group who were likely to remain low income over time (stable low income; $n = 278$), 2) a group who experienced a moderately high frequency of low income status at baseline (69.9%), and who were likely to end up as a low income household (unstable→low income; $n = 101$), 3) a group who were low income at baseline, but who were likely to end up as an adequate income household (low→adequate income; $n = 145$), 4) a group who initially had a moderate frequency of low income status at baseline (38.4%), but who were likely to end up as an adequate income household (unstable→adequate income; $n = 236$), and 5) a group who were likely to remain an adequate income household over time (stable adequate income; $n = 596$).

2.3.2. Descriptive Analyses. Means and standard deviations, as well as percentages were calculated to describe the study sample. Analysis of Variance (ANOVA) and chi-square analyses were conducted to compare characteristics between income trajectories.

2.3.3. Logistic Regression. IBM SPSS Statistics, Version 19 was used to conduct a series of binary logistic regression analyses to determine whether family income trajectory from birth to 15 years of age predicted smoking and alcohol use during the past year (yes or no), and ever-smoking (yes or no). Dual smoking and alcohol use during the past year (yes or no) was additionally explored as an outcome. Race/ethnicity and gender were included in the model given their associations with socioeconomic status (DeNavas-Walt, Proctor, & Smith, 2013) and substance use (SAMHSA, 2013). Income-to-needs-ratios at 1 month and 15 years of age were included in the model to isolate the influence of income trajectory, by adjusting for the effects of SES at birth and SES concurrent with study outcomes. Maternal smoking was included in the analyses where the outcome was cigarette smoking. Maternal alcohol use was included in the analyses where past-year alcohol use was the outcome. Individuals with missing covariates and/or outcome data at age 15 were excluded from the analyses, leaving an analyzable sample of 820-839 participants depending on the specific outcome.

3. RESULTS

3.1. Participant Characteristics

Participants ($N = 1356$) were primarily Caucasian, and nearly half were female. A total of 9.9% reported smoking 1 or 2 cigarettes in their lifetime, 3.9% reported smoking 3-10 cigarettes, 1.1% reported smoking 11-20 cigarettes, 4.4% reported smoking more than 20 cigarettes, and the remaining 80.8% reported that they had never smoked. See Table 1 for participant characteristics by trajectory (see also Kendzor, et al., 2012).

3.2. Income Trajectory, Cigarette Smoking, and Alcohol Use

Logistic regression analysis indicated that family income trajectory predicted ever-smoking at age 15 ($p = .023$; $N = 820$), after controlling for race/ethnicity, gender, income-to-needs-ratios at 1 month and 15 years of age, and maternal smoking (see Table 2). Specifically, those in class 1 (stable low income), class 2 (unstable → low income), class 3 (low → adequate income), and class 4 (unstable → adequate income) were all more likely to report ever-smoking than those in class 5 (stable adequate income). There were no other differences between trajectories. Neither race nor gender interacted significantly with income trajectory to predict ever-smoking. Family income trajectory was not a significant predictor of past-year smoking at age 15.

Logistic regression analysis indicated that family income trajectory predicted any alcohol use during the past year at age 15, after controlling for race/ethnicity, gender, income-to-needs-ratios at 1 month and 15 years of age, and maternal drinking (see Table 2). Those in class 2 (unstable → low income) were more likely to report past-year drinking than those in class 1 (stable low income), class 4 (unstable → adequate income) and class 5 (stable adequate income). Neither race nor gender interacted significantly with income trajectory to predict past-year alcohol use. Family income trajectory did not significantly predict dual smoking and alcohol use within the past year in the adjusted analyses.

3.3. Missing Data

Family income trajectories were calculated for 1356 participants, of which 39.5% were excluded in the model containing 'ever smoking' as the outcome due to missing data on 'ever-smoking' and/or covariates. Similarly 39.4% and 38.1% of the sample was excluded when the outcome variable was past-year smoking and alcohol use, respectively, due to missing data on outcome and/or covariates. Participants with missing data in the analyses where 'ever-smoking' was the outcome differed in several ways from those who did not have missing data. Participants with missing data had significantly lower income-to needs ratio at 1 month of age (2.39 vs. 2.92, $p = .001$), and had mothers who were younger (26.90 vs. 28.65 years, $p < .001$) and less educated (13.71 vs. 14.45 years, $p < .001$). Significant differences in the proportion of missing data by income trajectory were found ($p < .001$), such that those in the stable low income trajectory (class 1) had the highest proportion of missing data (48.6% missing), followed by the low → adequate (class 3; 29.7% missing), stable adequate (class 5; 26.8% missing), unstable → adequate (class 4; 21.6% missing), and unstable → low (class 2; 14.9% missing) income trajectories. Missing data did not vary by gender, race, maternal smoking, or income-to-needs ratio at age 15. Differences by missing

status in the analyses of the other outcome variables (past year smoking and past-year drinking) were similar to those found by missing status on ever smoking (results available upon request).

4. DISCUSSION

To the best of our knowledge, this is the first study to evaluate the influence of childhood family income trajectory on adolescent cigarette smoking and alcohol use. We previously identified five childhood income trajectories in this sample; two stable (stable low income and stable adequate income), one indicating downward socioeconomic mobility (unstable → low income), and two indicating upward socioeconomic mobility (low → adequate income; unstable → adequate income; (see Kendzor, et al., 2012). Findings indicated that family income trajectory was significantly associated with ever-smoking, such that children from each of the less advantaged trajectories were more likely to have smoked (ever) than children who experienced the most advantaged income trajectory (i.e., stable adequate income). Conversely, children of the downwardly mobile income trajectory were more likely to have used alcohol during the past year than children of the most advantaged trajectories (i.e., stable adequate income; unstable → adequate). Surprisingly, children who experienced downward socioeconomic mobility were also more likely to have used alcohol in the past year than children who experienced stable low income throughout childhood. Thus, findings indicate that socioeconomic disadvantage at any point during childhood increases the likelihood of adolescent smoking, while downward mobility, in particular, increases the likelihood of adolescent alcohol use.

Consistent with prior findings (Hanson & Chen, 2007; Melotti, et al., 2011; Tyas & Pederson, 1998), the prevalence of smoking was higher within all of the more disadvantaged trajectories relative to the most advantaged trajectory. Thus, social mobility did not seem to play a role in adolescent smoking. Rather the experience of socioeconomic disadvantage at any time during childhood was associated with an increased likelihood of smoking by 15 years of age. Even children who ended up with adequate income despite earlier disadvantage (i.e., low → adequate; unstable → adequate trajectories) were more likely to smoke than those who experienced adequate family income throughout childhood. As such, the findings may be better understood within the critical or sensitive period theoretical framework, such that any exposure to socioeconomic disadvantage during childhood increased the risk of smoking initiation. Not surprisingly, maternal smoking prevalence was higher in the disadvantaged trajectories than the stable adequate income trajectory, suggesting the possibility that exposure to maternal smoking and increased availability of cigarettes in the household might be contributing factors (Gilman, et al., 2009). It is unclear why income trajectory was not associated with past-year smoking in this sample, though it is possible that the relatively low prevalence (11.8%) limited the possibility of finding a relationship. Notably, the pattern of associations between income trajectory and past-year smoking appear similar to the associations between income trajectory and ever-smoking (see Table 1). Thus, future studies of income trajectory and smoking with larger adolescent samples may be needed.

In support of the social mobility model, findings indicated that the prevalence of alcohol use was highest in the downwardly mobile income trajectory relative to the most advantaged trajectories as well as the most disadvantaged income trajectory. Adolescents who experienced trajectories that ended with adequate income status each had similarly low rates of past-year alcohol use. Surprisingly, alcohol use was significantly less prevalent in the most disadvantaged group (stable low income) relative to the downwardly mobile income trajectory. Furthermore, rates of alcohol use were similar in the most disadvantaged (stable low income) and most advantaged (stable adequate income) trajectories. This is consistent with previous research showing that stable low income is linked with both a greater likelihood of total abstinence (0 drinks per day) as well as heavy drinking (≥ 3 drinks per day) relative to light/moderate drinking in adults (Cerdá, Johnson-Lawrence, & Galea, 2011). It is possible that the cost of alcohol may be prohibitive for the most disadvantaged families. This, in turn, may decrease regular exposure to parental alcohol use and reduce access to alcohol in the home.

Hill et al. (2013) suggest that children from economically unstable households may experience more development difficulties than children from stable low income households for a variety of reasons including inconsistent eligibility for government support, intermittent parental investment in children due to financial uncertainty, household chaos, and uncertainty-related stress. Research has indicated that instability in the household increases when mothers exit the workforce, resulting in more behavioral and mental health problems in children relative to those whose mothers remained part of the work force (Chase-Lansdale, et al., 2003). Likewise, evidence from the 'Moving to Opportunity' study indicated that adolescent boys whose families moved from higher to lower poverty neighborhoods had relatively fewer emotional, mental and dependency problems than the control group that continuously stayed in public housing (Leventhal & Brooks-Gunn, 2003). Notably, data in the present study were collected prior to the major economic recession that began in the U.S. in 2007. Plausibly, recession-related decreases in income, increases in poverty, and overall downward mobility (see Seefeldt, Abner, Bolinger, Xu, & Graham, 2012) may lead to increases in smoking and alcohol use among adolescents in the years following the recession.

Significant differences in child and maternal characteristics were observed across the family income trajectories. Children who followed the most disadvantaged trajectories (i.e., classes 1 and 2) were more likely to be non-white, and to be living below the poverty threshold at birth. They also had younger mothers with lower education levels (see also Kendzor, et al., 2012). In addition, the prevalence of maternal alcohol use increased from the most disadvantaged to the most advantaged trajectory. Perhaps disposable income in higher income families contributed to high rates of maternal alcohol use (nearly 90%) within the stable adequate income trajectory. Alternatively, desire to network and fit in a social circle within and outside of work may partially explain why adults earning higher incomes and with greater education are more likely to drink alcohol (Peters & Stringham, 2006). Conversely, the prevalence of maternal smoking decreased from the most disadvantaged trajectory (stable low income) to the most advantaged trajectory (stable adequate income). Hence, the most disadvantaged children are more likely to be exposed to maternal smoking.

4.1. Strengths

Our understanding of the influence of childhood SES on alcohol and/or tobacco use in adolescents has been limited by cross-sectional study designs. Thus, the prospective SECCYD provided a rich source of data to examine SES patterns over a period of 15 years starting from birth. Family income was measured at 13 time points over the 15 year study period, thereby providing detailed information about childhood SES. In addition, we included maternal smoking and alcohol use as covariates in our analyses because these factors are known to influence substance use in children (Green, et al., 1991; Rosendahl, Galanti, Gilljam, & Ahlbom, 2003). To isolate the influence of socioeconomic trajectories, we included income-to-needs ratio at 1 month and 15 years of age to adjust for the effects of both initial and ending SES.

4.2. Limitations

The assessment of alcohol and smoking-related outcomes in the present study was limited to simple dichotomous yes/no responses. For example, although the prevalence of alcohol use in the stable low income trajectory was not significantly different from the prevalence in the stable adequate income trajectory, it was not possible to assess whether the alcohol consumption patterns (light/moderate/heavy drinking) were also similar in these two groups. In addition, the proportion of children who reported ever smoking in the present sample was 19.3% which is considerably lower than the 44.7% reported in the YRBSS (Eaton, et al., 2012). This is likely because adolescents greater than 15 years of age were not included in the study, and younger adolescents may be less likely to smoke. It is also important to consider the possibility that the participants underreported their tobacco and alcohol use in an attempt to provide socially acceptable responses (Percy, McAlister, Higgins, McCrystal, & Thornton, 2005; Stein, et al., 2002). Another limitation of the study is the sole focus on mothers (rather than fathers) and their children, and thus some study measures (including family income status) represent only the perspective of the mother. Finally, the high proportion of missing data on the outcome variables and/or covariates is also notable. Participants with missing data differed significantly by family income trajectory, maternal age, education, and income-to-needs ratio. Children belonging to the lowest income trajectory were less represented in the analysis sample, which may have resulted in an underestimation of the effect of key findings.

4.3. Future Directions

Future studies should focus on characterizing the mechanisms through which socioeconomic position in childhood influences adolescent substance use. Potential mechanisms may include increased levels of stress and financial strain, increased exposure to parental smoking, and compromised interactions with parents (perhaps due to increased parental stress). Gaining a better understanding of the pathways through which childhood socioeconomic disadvantage influences smoking and alcohol use in adolescence may facilitate the development of targeted prevention strategies as well as substance use interventions for adolescents and parents. The prevalence of concurrent tobacco and alcohol use was relatively low in the current study, thus future research should examine the effect of family income trajectories on concurrent tobacco and alcohol use later in high school when

dual use may become more common. It will also be important to investigate the influence of changes in other key indicators of socioeconomic status, such as increases in maternal education over time, which may protect against adolescent substance use.

4.4. Conclusion

Socioeconomic disadvantage in childhood is associated with smoking and alcohol use in adolescence. Children who experienced socioeconomic disadvantage at any time during childhood were more likely to have smoked by 15 years of age than children who experienced stable adequate income. Children of the downwardly mobile income trajectory were more likely to have used alcohol during the past year than children of the most advantaged trajectories as well as those who experienced stable low income. Thus, policy-level efforts to increase parental education and earning potential may positively influence the development of children. Substance use prevention efforts that target disadvantaged children may attenuate the negative effects of socioeconomic disadvantage during childhood. Smoking cessation programs must also target disadvantaged parents and teens who smoke.

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HIGHLIGHTS

- The impact of childhood income trajectories on adolescent substance use was examined.
- Models of childhood socioeconomic status and health were evaluated.
- Any experience of childhood socioeconomic disadvantage was associated with smoking.
- Downward socioeconomic mobility in childhood was associated with alcohol use.
- Findings support the critical period and social mobility models of health.

Table 1

Participant Characteristics by Income Trajectory.

	Stable Low (Class 1)	Unstable → Low (Class 2)	Low → Adequate (Class 3)	Unstable → Adequate (Class 4)	Stable Adequate (Class 5)	p	All Participants
Age 1 Month							
Race/Ethnicity (% non-White)	51.4	31.7	26.9	15.3	11.9	<.001	23.7
Gender (% female)	50.7	45.5	39.3	48.7	50.0	.175	48.5
Maternal Years of Education [Mean (SD)]	12.1 (1.8)	13.1 (1.9)	13.1 (2.2)	14.2 (2.1)	15.7 (2.1)	<.001	14.2 (2.5)
Income-to-Needs Ratio [Mean (SD)]	.54 (.61)	1.59 (1.08)	1.15 (1.03)	2.59 (2.09)	4.27 (2.84)	<.001	2.76 (2.66)
Poverty Threshold (%)	74.8	33.3	49.2	10.5	2.6	<.001	24.3
Twice Poverty Threshold (%)	98.7	69.9	92.4	38.4	13.3	<.001	45.8
Age 15 years							
Income-to-Needs Ratio [Mean (SD)]	1.42 (.94)	1.69 (1.10)	4.00 (3.43)	4.09 (3.18)	7.94 (7.02)	<.001	5.26 (5.79)
Poverty Threshold (%)	36.2	17.9	0	1.7	0	<.001	7.4
Twice Poverty Threshold (%)	78.3	76.2	8.1	12.2	.2	<.001	21.9
Maternal Smoking (current or past; %)	58.7	54.8	52.0	38.1	31.0	<.001	40.8
Maternal Alcohol Use (current or past; %)	71.2	72.9	73.1	76.2	89.8	<.001	81.1
Ever-Smoked (%)	26.6	34.9	26.5	22.2	10.8	<.001	19.2
Past-Year Smoking (%)	13.2	20.7	18.6	14.1	7.1	<.001	11.8
Past-Year Alcohol Use (%)	18.8	36.8	28.4	25.9	22.1	.016	24.3
Past-Year Smoking and Alcohol Use (%)	10.4	17.2	13.7	11.9	6.4	.008	9.9

Note: Unadjusted ANOVA or chi-square analyses were conducted to compare participant characteristics by income trajectory.

Table 2

Associations between childhood family income trajectory and adolescent smoking and alcohol consumption at age 15 years.

	Ever-Smoker (0=No; 1=Yes)			Smoking Past Year (0=No; 1=Yes)			Alcohol Past-Year (0=No; 1=Yes)		
	B (unstandardized)	OR (95% CI)	p	B (unstandardized)	OR (95% CI)	p	B (unstandardized)	OR (95% CI)	p
Race/Ethnicity (1=White; 2=Non-White)	-.28	.75 (.48, 1.18)	.216	-.229	.80 (.47, 1.35)	.395	-.12	.89 (.59, 1.35)	.589
Gender (1=Male; 2=Female)	-.05	.95 (.66, 1.37)	.778	-.184	.83 (.54, 1.28)	.405	-2.43	.78 (.57, 1.08)	.141
Income-to-Needs Ratio (1 month of age)	-.06	.94 (.84, 1.06)	.290	-.076	.93 (.81, 1.07)	.282	.07	1.07 (.99, 1.16)	.099
Income-to-Needs Ratio (15 years of age)	-.01	1.01 (.97, 1.06)	.624	.011	1.01 (.96, 1.07)	.671	.01	1.01 (.98, 1.05)	.397
Maternal Smoking (0=Never smoked; 1=Ever Smoked)	-.40	.67 (.46, .97)	.036	-.445	.64 (.41, .996)	.048	-	-	-
Maternal Alcohol Consumption (0=Never drank; 1=Ever drank)	-	-	-	-	-	-	-22	.80 (.51, 1.24)	.320
Family Income Trajectory (Ref = Class 5 [Stable Adequate])	-	-	.023	-	-	.114	-	-	.008
Class 1 (Stable Low)	.72	2.05 (1.02, 4.10)	.043	.38	1.46 (.63, 3.39)	.381	.20	1.22 (.65, 2.32)	.537
Class 2 (Unstable → Low)	1.07	2.93 (1.50, 5.71)	.002	.81	2.26 (1.02, 4.99)	.045	1.05	2.86 (1.58, 5.17)	.001 [†]
Class 3 (Low → Adequate)	.77	2.17 (1.10, 4.26)	.025	.84	2.33 (1.07, 5.03)	.032	.57	1.78 (.97, 3.25)	.063
Class 4 (Unstable → Adequate)	.61	1.84 (1.08, 3.14)	.026	.64	1.89 (1.01, 3.54)	.045	.33	1.39 (.87, 2.21)	.167

[†] Class 5 is the reference group in the analyses that are presented in this table, but please note that class 2 also differed significantly from classes 1 and 4 in the likelihood of past-year alcohol use (p 's<.05).