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The Effects of Family Stressors on Substance Use Initiation in Adolescence¹

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Abstract

Smoking and drinking are critical problems in adolescence that have long-term adverse impacts on health and socio-economic factors. We examine the extent to which family stresses influence the timing of initiation of smoking and drinking. Using national panel data from the National Educational Longitudinal Study (NELS) we capitalize on the survey design and use school-level fixed effects that control for the local environments, including prices of cigarettes and alcohol. In addition, we narrow our control group to classmates who will experience a similar stressor in the future. We find that a composite measure of family stressors when young increases the likelihood of initiating tobacco and alcohol use, with much of the impact attributable to parental divorce. In our baseline estimates, the composite stress measure is associated with a 30% increase in the likelihood of smoking and a 20% increase in drinking. When we control for multiple sources of confounding, the impact shrinks and remains significant for smoking but not for drinking. We conclude that studies which do not control for confounding are likely to significantly overestimate the impact of family stress on substance use. Our approach helps to move the literature forward by separating causal results from spurious associations.

Keywords

Substance Use; Family Stress; Confounding

Introduction

Almost all smokers start prior to age 19 in the US and many youths drink. Smoking and drinking in youth harm developing brains and bodies (Dahl, 2004; Giovino, 2007; Surgeon General Report, 1994, 2004) and due to addictive properties, they lead to future substance abuse as well. Thus early consumption can have long-term, adverse effects and it is important to better understand the determinants of early substance use. While multiple factors can put adolescents at heightened risk for smoking and alcohol abuse², one of the most robust predictors of adolescent substance abuse is previous experience of stressful events (see for example Swadi, 1999; Kassel et al., 2003).

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²These include: peer influences (Fletcher, 2009; Gerrard et al., 1999); stress (Masten, 2004; Clark et al., 1997); and environmental and family factors; psychological and psychiatric disorders; and genetic predispositions (Rose, 1998; McGue et al., 2000). The impact of these factors may be moderated by other influences such as age, gender, and cognitive ability (Span and Earleywine, 1999).

Previous literature has found that early childhood abuse, neglect or other household dysfunction, or other stressful occurrences (Koval and Pederson, 1999; Anda et al., 1999; and Osofsky, 1999; Lloyd and Turner, 2008) can lead to increased smoking and drinking. Dube et al. (2003) found a strong gradient in the number of adverse childhood experiences, such as abuse, divorce, and domestic violence in childhood, on illicit drug use in adolescence and adulthood. Anda et al. (1999) also find evidence of an effect of cumulative adverse experiences on smoking initiation by age 14. In particular, divorce has been linked with smoking initiation (Patton et al., 1998; Anda et al., 1999). However, these studies typically use only one geographic site (Lloyd and Turner, 2008), a single school (Koval and Pederson, 1999), one clinic (Anda et al. 1999; Dube et al. 2003) or a small sample (Clark et al. 1997; 132 observations) so that the results are not generalizable; however, because the data are drawn from only one location, they effectively control for local conditions. Patton et al. analyze data on students from 44 schools in Victoria, Australia using a six wave cohort design, but these results may not be generalizable to all of Australia. Further, these studies do not attempt to control for confounders beyond including control variables in the regressions.

One potential mechanism that could link stressful events with substance use is the finding that many individuals respond to stress by developing coping mechanisms such as self-medication, often through the use of substances (Wills and Shiffman, 1985; Khantzian, 1997; Kassel et al., 2003). The use of tobacco and alcohol are thought to serve as coping devices by allowing the user to regulate mood fluctuations caused by stressors. For instance, there is evidence that nearly all smokers attribute part of the reason they smoke to the sedative properties of the tobacco (Spielberger, 1986; Leventhal and Cleary, 1980) and say that they smoke more when stressed (see Kassel et al., 2003 for cites). While these studies support examination of family stressors as causes of later substance abuse, the studies typically do not address confounding, which could produce spurious findings.

In this paper, we examine the impact of family stressors, including parental divorce, episodes of family welfare receipt, and parental unemployment, on the initiation of tobacco and alcohol use in youths. We use a large, nationally representative, prospectively collected data set—the National Education Longitudinal Study (NELS). Using the school-based study design of NELS, we use school fixed effects (SFE) and are, in essence, able to control for confounding related to the local environment. The SFE design controls for the local price of cigarettes and alcohol; school restrictions and attitude toward smoking by classmates (peer effects); density of sales outlets of tobacco and alcohol; and the broader local environment; among other factors. Further, in our preferred analysis, we use the longitudinal nature of the data to create comparison groups between adolescents who experience a stressful event in each wave and those who *will experience the event in the future*. This also addresses potential confounding based on the unequal family-level risk of experiencing a stressful event.

Our contribution to the literature stems from the multiple approaches we use to address confounding. Our methods overcome several of the limitations of current research that has linked stress to substance use. Studies using national samples often do not control for important environmental factors. However, it is well documented that neighborhood characteristics can influence both exposures to stressors as well as substance use choice. The use of SFE helps to address confounding. In addition, our ability to construct a sample of youths, all of whom experience family stress sometime in their youth, allows analysis of a more homogenous sample. Addressing confounding in these two important dimensions helps the literature move toward separating causal results from spurious associations.

Our estimates suggest that there are often significant increases in the likelihood of initiating tobacco use and drinking during adolescence with the occurrence of stressful family events. The effects differ substantially by the type of family stress and across smoking and drinking. The estimates shrink when we control for multiple sources of confounding. For example, the effect of parental divorce on smoking initiation is reduced from an estimate of 50% to 30% with controls for confounding. Divorce and 'any stress' each significantly impacts smoking even when our full set of controls for confounding are included. However, while the stressors are significant in most regressions of smoking, they are insignificant in the regressions with the full set of controls. Unemployment of the parent has a significant impact on substance use in all regressions except those with our full controls. Welfare is always insignificant.

Data

This paper uses the National Educational Longitudinal Study (NELS) data to examine the determinants of adolescent cigarette and alcohol use with a focus on family stressors. The NELS data set is a national, longitudinal survey administered initially to a cohort of 8th graders in 1988. These students were drawn from a nationally representative sample of over 1,000 schools in the US. Students were followed through school and into young adulthood, for 12 years. They were also surveyed in 1990, 1992, and 2000. The study originally administered questionnaires and achievement tests in reading and mathematics to over 24,000 8th graders who were situated in over 1,000 public and private schools. Budget constraints forced the sample to be reduced at first follow-up, which, combined with attrition, reduced the number of students surveyed through wave 3 to approximately 17,000. Survey information was also collected from the students' parents, teachers and principals. On average, about 20 students at each school are included in the sample (the number ranged from 1 to 70 students per school).

After non-response to smoking status and other variables are dropped, the Wave 1 sample for our analysis of smoking is 16,673 students of the possible 17,151 observations. We focus on observations from each student for grades 8, 10, and 12. This translates to a substantially bigger sample as measured in person-wave observations, which is our unit of observation. Because we are interested in initiation of substance use, once the student has reported that they have started to smoke or drink, they are eliminated from the analytic sample. Thus, the number of observations in the analytic sample is reduced across the years due to our approach of continually updating the data subsample with regard to who is 'eligible' to initiate drinking or smoking. Questions on alcohol consumption were asked only in the 10th grade and 12th grade waves so we have a smaller number of person-wave observations. Finally, because we use school fixed effects in the analysis, some students drop out the analytic sample because either: 1) only one student was sampled in a particular school, or 2) there was no variation in response across the students in the school (if all, or no, students smoked).

Subsamples

We use several different subsamples for our analysis. First, we have separate smoking and alcohol use samples due to the fewer waves of data on alcohol. Second, in order to isolate the sample to those whose families are observed to experience a stress (parental divorce or unemployment or family on welfare) sometime over the period of observation, we develop two samples for to each outcome. The first is the full sample and the second is only those students whose family experiences a stressful event (e.g. divorce) sometime over the three waves of data.

In addition, we confine our sample to only those who are 'eligible' to experience a stress. Because only married couples can divorce, we drop those who were never married at the time that their kids are in 8th grade (2% of the sample) in the regressions analyzing divorce. We drop those who parents were never employed by the time of 8th grade in the regressions using employment variables. The remaining samples are composed of only those whose families are eligible to make the transitions into divorce and unemployment. Any family would be 'eligible' to go on welfare, so we did not make a sample selection based on this stress.

To be concrete, the full data set used to examine the impact of a composite measure of stress on smoking initiation has 16,673 observations (43,568 student-wave observations). When we use only students who experience a stressful event, the sample is reduced to 14,396 student-wave observations. When we examine only those who experienced at least one of the stresses sometime over the survey period and control for school fixed effects, the sample size is smaller, at 11,386. Similarly for each family stress, the number of observations is greatest in the full sample, is reduced when limited to the sample of those who will experience each stress and is reduced again when using school fixed effects. The initial sample size varies across stressors due to differing numbers of missing observations on each stress. The decline in sample size for the subsamples depends on the frequency of families experiencing each stress. In the case of welfare, the initial sample size for the smoking regression is rather large (42,227 person-wave observations) because there is little missing data on welfare. However, because many fewer students experienced being on welfare, the subsample for those ever on welfare declines quite a bit to 2,414 overall and to 1,148 when using SFE.

Dependent variables

We examine smoking and drinking behaviors. For each substance there are two measures, one indicator of whether or not the individual uses and a second indicator measuring intensity. In the analysis, our primary measures are binary indicators of use, indicating whether the student is a smoker or drinking. Students are considered to be smokers if they reported smoking a positive number of cigarettes per day and they are considered to be a drinker if they report a positive number of drinks over the past month. Heavy smoking is defined as smoking $\frac{1}{2}$ a pack or more each day. Binge drinking is defined as consuming more than five drinks in one sitting. Findings for our regressions of smoking and drinking intensity measures are provided in appendices.

Independent variable- stresses

We take advantage of the multiple measures of family stress to develop a composite measure of stress as well as disaggregate into the specific components of family: divorce, welfare recipient, and unemployment. Parents are asked about these stresses in each wave. In the baseline wave, divorce measures any divorce that has occurred up to the interview. Because we are interested in new events, we formulate the divorce measure in Waves 2 and 3 to indicate new divorces that occur after the last interview but prior to the current one. Thus the divorce indicator in each wave measures new divorces. The binary variable 'anystress' indicates whether the adolescent experienced any of these three stresses. We measure each stress in a manner similar to divorce above with respect to baseline and future incidents.

Additional independent variables

The set of additional control variables includes gender, family size, number of older siblings, maternal education, mother's current age, reading and math test scores, family income, and race. These variables are exogenous to the decision to smoke as they are

predetermined at the point of the adolescent's smoking decision. Indicators of the wave of the survey are also included and we control for whether the adolescent ever dropped out of school, following (DeCicca et al., 2002). We also include a measure of locus of control in the analysis.³

Table 1 provides descriptive statistics by wave. Note, the sample shrinks as individuals initiate smoking and are thus no longer at risk of starting. Five percent of the sample begins smoking by 8th grade, 14% more by 10th grade, and 13% more by 12th grade. Two percent of the sample is categorized as a heavy smoker (1/2 pack a day or more) by 8th grade, 9% more by the 10th grade, and an additional 9% by the 12th grade. Drinking behaviors were not asked during 8th grade, but 38% report drinking in grade 10 and an additional 36% by grade 12. With regard to binge drinking, 22% report binge drinking in grade 10 while another 23% in grade 12. Because the survey begins in 8th grade, the proportion of divorce relatively high at the initial wave (11%) as it captures the cumulative divorces to this point. Approximately 7% of the sample experiences a parental divorce in each subsequent wave. Table 1 displays the percentages of adolescents experiencing welfare and parental unemployment by wave.

In our preferred estimates, we use the sample of all individuals who eventually experience divorce of their parents, parental unemployment, experience welfare, or experience any stress. The Appendix 1A presents summary statistics for the sample of students who will ever experience a parental divorce, welfare, or parental unemployment in separate columns. As expected, these samples are somewhat less advantaged and the students are more likely to smoke, smoke heavily, drink and binge drink. As can be seen in this appendix, these samples are necessarily smaller than the overall sample. In particular, there are relatively few students who report their family being on welfare yielding a maximum sample of 977 8th grade students. The similar samples sizes are 3,164 and 2,716 for those ever experiencing divorce and unemployment respectively.

Empirical Model

The empirical model focuses on the probability of starting to smoke or drink at different time points. We take advantage of the panel data by estimating a discrete time hazard model of initiating each behavior at each wave. Our approach is to continually update the data subsample with regard to who is 'eligible' to initiate drinking or smoking behaviors. Once the student has reported that they have started to smoke or drink (each examined separately), they are eliminated from the next wave of the data because they are no longer 'eligible' to start smoking (see DeCicca et al. 2000, 2002). The sample, then, consists of each individual who is at risk of substance initiation at each wave. For example, as shown in Table 1, 5% have started to smoke by the first wave of the survey. This 5% who had already started smoking is then eliminated from the sample for the subsequent wave as they are no longer at risk of starting to smoke. These individuals are then no longer eligible to start smoking in later surveys; all other students in the sample are at risk of smoking initiation in 10th grade and thus are included as a second observation in the analysis sample. Likewise, individuals who did not start smoking in 10th grade are at risk in the 12th grade wave of the survey. The

³Locus of control is of particular interest because those with a high level of internal locus of control tend to have better command over their behaviors, such as smoking and drinking. A high internal locus of control refers to the extent to which individuals believe that they, through their choices, can control events that affect them. A high external locus of control refers to the belief that their outcomes are determined primarily through outside events, chance or even fate. In each wave, a locus of control scale is administered to the students. The scale measures both internal and external levels of control on a single axis. The locus of control survey asks, for example, how the student feels about themselves. The high internal locus of control responses to select from include: "I feel good about myself; I am able to do things as well as most other people" and other similar responses. The high external locus of control responses include, for example: "I don't have enough control over the direction my life is taking. In my life, good luck is more important than hard work for success". We use the validated scale to measure locus of control provided by NELS.

same process is repeated for those who started smoking in each of the subsequent waves. Individuals are in the sample a different number of waves depending on how soon they start to smoke, if at all. The similar approach is used for drinking.

With this setup, the dependent variable is the hazard rate, measured as the probability that a student will start smoking, for example, at each survey wave for those still at risk. DeCicca et al. (2000) suggests thinking of the hazard model as a demand function for tobacco at the beginning of the addiction:

$$Smoke_i = \beta_1 Stress_i + \beta_2 Grade_i + \beta_3 X_i + \varepsilon_i \quad (1)$$

where we use logistic regression analysis and include time varying stressor variables (e.g. parental divorce), grade (wave) dummies, and time-constant regressors (X) discussed above. We use robust clustered standard errors at the school-level. We also include school level fixed effects in some specifications in order to control for local cigarette prices and restrictions and other environmental factors.

$$Smoke_{is} = \beta_1 Stress_i + \beta_2 Grade_{is} + \beta_3 X_i + \mu_s + \varepsilon_{is} \quad (2)$$

We estimate these sets of regressions for the two different samples for each outcome. One is all students and the second is only those students who experience a stress sometime in the sampling window. The latter allows comparisons between students who are at similar risk of experiencing the stress of a parental divorce or the family on welfare. This method controls for what would otherwise be unobservable differences in families. It is an advance over previous studies in that we are therefore better able to control for difficult to measure differences and similarities across families that could confound our results. Those families who eventually experience a divorce or being on welfare may be more similar to each other as compared to those who do not experience these stresses.

Results

In Tables 3 and 4 we present results of the impact of family stress on smoking and drinking. The first two columns of the tables use the full sample of students while the last two columns use the sample that ever experienced a parental or family stress. In the odd columns, we present baseline results, and we control for school fixed effects in the even columns. The last column presents our preferred results. These results use the sample of those who ever experienced the stress and also includes school fixed effects. Thus, confounding is controlled more completely in the last column. The same approach applies to the results that are presented in Appendix 2A and 3A for the measures of intensity in smoking and binge drinking. The results for the intensity measures are qualitatively similar.

Smoking

In column 1 of Table 2, we find that students who experience any stress are significantly ($p > .001$) more likely to smoke (OR 1.30), even controlling for family characteristics and whether the student will eventually drop out of school. When we include school-level fixed effects (SFE) in order to control for environmental confounding, the OR decreases very slightly. Turning to the sample of those who experience any of these stresses sometime within the window of observation, we find in column 3 that the OR decreases somewhat and when SFE are also included, the OR drops again to 1.19 (col 4). The high level of significance is maintained across specifications. Overall, our controls for confounding reduce the magnitude of the coefficient by nearly 35%. Despite the reduction, even when we compare classmates who each experience a stress within the sample window (col 4), the

results are highly suggestive of a fairly large (almost 20%) and significant effect of family stress on smoking initiation during high school.

Most of the additional explanatory variables are significant and of the expected sign. Further, the impacts are surprisingly stable across the specifications, even when we compare classmates. For example, like other studies, we find substantial racial differences in smoking, with whites significantly more likely to smoke. The number of older siblings significantly increases the propensity of smoke. Better reading and math scores have a slightly negative impact on the probability of smoking. Ever dropping out of school increases the probability of smoking threefold and is quite significant. Mother's age has a very slight protective effect in the full sample estimates while gender is always insignificant in impact. Interestingly, a higher locus of control significantly reduces the likelihood of starting to smoke (OR about .80).⁴

Table 3 decomposes the coefficients from Table 2 into the effects of divorce, welfare and unemployment on teenage smoking initiation. For ease of comparisons, we again display the coefficient on any stress from Table 2 in Row 1 of Table 3. In Table 3 we only display the coefficient on the stressors as these are our key findings and the coefficients on the additional explanatory variables are similar across the estimates. The full set of results is displayed in the Appendices 4A–6A.

In Row 2, the results suggest that divorce has a significant impact on smoking with the OR decreasing in magnitude across the specifications from an OR of 1.54 in col. 1 to an OR of 1.29 in the final specification with SFE for the sub-sample that experiences a divorce at some point. Divorce is significant in all specifications and it seems to be driving the results for 'anystress'. Like the results for 'anystress', our controls for confounding substantially reduce the magnitude of the baseline effects—in this case by about 45%. However, even with our very strict comparison groups in column (classmates who each experience a parental divorce during the panel), we still find a substantial impact of divorce on smoking initiation. One limitation with this approach, is that some individuals who have not yet experienced the stressful event itself may be currently experiencing stress in advance of the event occurring. For example, a family may experience the stress of marital conflict or parental separation prior to a divorce. This could bias the comparison toward zero because the “untreated” individuals are receiving a “partial treatment” through the parental conflict or separation. This limitation should be considered when viewing the results.

Examination of the results displayed in Rows 3 and 4 indicate that the effects of family stressors are quite heterogeneous across types of stress. Specifically, the results suggest that welfare receipt transitions are not statistically related to smoking initiation by teenagers. In Row 4, we examine parental unemployment transitions. The first column indicates that parental unemployment increases smoking initiation by a significant 20%. However, again there are substantial reductions in the estimates after controlling for confounding factors and narrowing the comparison sample. In fact, in column 4, the results are statistically insignificant and smaller, though still non-trivial in magnitude.

In robustness checks, we also estimated the same set of regressions but using a higher cut point on cigarette consumption. We used a binary outcome of whether the smoker smoked a half a pack or more a day. This would represent heavier or habitual smoking. The results are very similar for heavy smoking so the results are displayed in Appendix 2A. The key point

⁴In sensitivity analyses we estimate specifications without locus of control due to the potential endogeneity; the coefficients of the stress variables are virtually unchanged when locus of control is omitted. We use the locus of control measured only in 8th grade; we carry forward the measure of locus of control as if it were a time-invariant trait.

is that the results are robust to this alternative measure of smoking. We also conducted robustness checks to test if the impact of the stress varied depending on when it occurred. We hypothesized that a stress later in adolescence might have had less impact as patterns were already established. This was tested this by a Wave-Stress interaction, however, no significant impacts were found.

Drinking

Table 4 displays the results for the impact of family stresses on drinking. Following the approach used in Table 3, we display only the coefficients on the stress variables; these are our key results. Full results for these specifications can be found in the Appendix 7A–10A. The results for drinking are qualitatively similar to those of smoking. For example, divorce has the largest impact, followed by 'anystress' and then parental unemployment. Also similar to the finding for smoking, welfare is never significant. However, there are a few important differences. First, the impacts of the stressors are somewhat smaller in magnitude. For example, for 'anystress' the impact on drinking initiation ranges from a 23% increase in drinking in the baseline specification to a 7% increase in the final specification (and it is insignificant at standard levels for the latter). The impact of divorce and unemployment are similarly, slightly reduced as compared to for smoking initiation. The second difference is that the coefficients in column 4 are insignificant in all cases. We are unable to reject no effects of family stresses on drinking initiation in the final specifications. This may occur in part because due to a smaller sample size as we do not have drinking information from the students when they are in 8th grade.

We used an alternative measure for alcohol consumption as well. A binary indicator of binge drinking, defined as 5 or more drinks per episode, was used in robustness checks. As can be seen in the Appendix 3A, the results are qualitatively and quantitatively similar to those found for drinking initiation. The magnitudes are quite similar across the two sets. There are only a few differences in the level of significance; divorce is always significant and unemployment is never significant.

Summary and Discussion

We find evidence that family stressors of divorce and unemployment increase initiation rates of smoking. The patterns of results are similar across smoking and drinking although both the magnitude and significance are reduced for drinking. Divorce is the most significant stressor and has the largest impact; experience of unemployment is close behind. However, being on welfare is never significant. This lack of significance may occur because the youths may not be fully aware that the family was on welfare. Our results suggest that studies that do not control for confounding may overestimate the impact of early stress.

This paper makes several contributes to the research on whether and to what extent family stress affects adolescent substance use decisions. One important improvement is better controlling for confounding. We control for environmental confounding through the use of school fixed effects and also narrow the comparison samples to those who eventually experience the stress. The use school-level fixed effects controls for local factors such as prices, density of sales outlets for tobacco and alcohol, cost of living, smoking restrictions locally and at the school, attitude toward drinking and smoking at school, etc. By narrowing the sample, we control for unobserved difference across families that do and do not experience each stress. Together, these adjustments allow us to examine students who went to the same school and who all will experience a stress at some time in the period of observation.

In addition we control for potential confounding by using a rich set of control variables such as student test scores as well as socio-economic, demographic and family variables. Further, due to the longitudinal nature of the NELLS, we do not have to rely on retrospective data and the associated issues of recall bias. Another advantage of our study is that some of the measures are reported through the school (such as scores) and the parents (the stressors), they are not self-reports from adolescents. Further, our approach confines the analysis to only those who are 'eligible' for initiating the behaviors, that is, when the student starts to smoke, they are eliminated from the sample of those who are at risk of smoking. These improvements over the extant literature move our findings closer to establishing causality between early stress and initiation (and intensity) of smoking and drinking. Also, because NELLS provides a national sample, our results are generalizable.

No previous study has, to our knowledge, controlled for these potential sources of confounding factors using these methods. Thus while our results confirm the findings of previous studies that early stress increases smoking and drinking behavior of adolescents, to the extent that previous studies have not controlled for confounding, they may have overestimated the impact of family stressors. Studies using only data from one geographic location do control for the local environment, but these studies are not necessarily generalizable (e.g. Lloyd and Turner, 2008; Anda et al. 1999). By comparing our results from specifications with no adjustments to address confounding to our results with both the adjustments, we can infer that previous research may have over-estimated the impact of early stress on smoking and drinking of adolescents. For smoking we estimate that the inability to control for confounding can yield overestimates of approximately 35–45%. For drinking, the coefficients on stress become insignificant for all stressors when we control for multiple sources of confounding.

Limitations of the study include that we only can examine a few stressors; our estimates may be capturing correlated household stressors. The use of our composite measure helps to address this to some extent. Also, we are unable to measure the duration and severity of the stress. While we measure the timing of the stress, we cannot control for the stress that might occur in advance of the stressful event, e.g. marital strife prior to a divorce. Another threat to inference is that families may get a divorce or otherwise change their behavior in response to children with behavioral problems. Unfortunately, the data do not allow us to address this limitation. Self-reporting could provide measurement error, but recall is not likely to be a major problem as we have prospective, longitudinal data and some of our reports come from the school or the parents. In addition, there may be other omitted variables such as mental health problems or ability to cope with stress that we cannot measure. Further, while we examine initiation (and intensity of smoking and drinking in the appendix), we do not examine how these stressors affect continued smoking and drinking. Another potential concern could be our sample selection approach to define more similar groups of youths, e.g. all those who will experience a parental divorce. While we believe that we have advanced the literature with this innovation, we recognize that the selection approach is subject to some additional concerns.

While we suggest that earlier studies may have over-estimated the impact, our evidence confirms that early stress, even when controlling for confounding, can have harmful impacts on adolescents, especially for smoking decisions. Thus addressing family stressors in youth could have long-run beneficial impacts. A better understanding of the impact of family stressors on drinking and smoking may pave the way to developing solutions to these pressing problems.

Appendix

Appendix 1A

Descriptive Statistics for “Ever” Samples National Education Longitudinal Study

Variable	Wave	Ever Divorced			Ever Welfare			Ever Unemployment		
		Obs	Mean	Std.	Obs	Mean	Std.	Obs	Mean	Std.
Smoker	8th	3164	0.06	0.25	977	0.07	0.25	2716	0.05	0.21
Heavy Smoker	8th	3164	0.03	0.16	977	0.03	0.16	2716	0.02	0.14
Drink	8th	0			0			0		
Binge Drink	8th	0			0			0		
Divorce	8th	2978	0.54	0.50	783	0.23	0.42	2452	0.14	0.34
Welfare	8th	2967	0.04	0.20	910	0.35	0.48	2602	0.05	0.22
Parental Unemployment	8th	3068	0.05	0.22	861	0.12	0.33	2628	0.22	0.41
Any Stress	8th	3163	0.55	0.50	974	0.47	0.50	2715	0.33	0.47
Male	8th	3164	0.47	0.50	977	0.45	0.50	2716	0.47	0.50
Family Size	8th	3164	4.15	1.44	977	5.05	1.76	2716	4.66	1.49
Number of Older Siblings	8th	3164	1.24	1.32	977	1.51	1.61	2716	1.32	1.37
Maternal Education	8th	3164	12.63	2.69	977	11.36	2.40	2716	12.29	2.65
Maternal Age	8th	3164	39.83	5.83	977	39.71	7.02	2716	40.18	6.20
Reading Score	8th	3164	50.49	9.80	977	46.88	8.78	2716	50.66	9.81
Math Score	8th	3164	50.53	9.75	977	47.02	8.48	2716	50.54	9.91
Family Income (\$10,000s)	8th	3164	3.25	2.99	977	2.07	2.21	2716	3.36	2.78
Black	8th	3164	0.12	0.33	977	0.21	0.41	2716	0.14	0.34
Hispanic	8th	3164	0.12	0.32	977	0.24	0.43	2716	0.15	0.36
Other Race	8th	3164	0.08	0.28	977	0.13	0.33	2716	0.10	0.30
Locus of Control	8th	3164	0.00	0.71	977	-0.16	0.77	2716	-0.03	0.73
Ever Dropout	8th	3164	0.13	0.34	977	0.20	0.40	2716	0.11	0.32
Missing Information	8th	3164	0.20	0.40	977	0.22	0.41	2716	0.19	0.39
Smoker	10th	2711	0.18	0.39	792	0.17	0.37	2402	0.16	0.37
Heavy Smoker	10th	2711	0.11	0.32	792	0.12	0.33	2402	0.10	0.31
Drink	10th	2686	0.44	0.50	782	0.36	0.48	2388	0.40	0.49
Binge Drink	10th	2673	0.27	0.45	781	0.23	0.42	2376	0.23	0.42
Divorce	10th	2670	0.36	0.48	778	0.14	0.35	2365	0.10	0.30
Welfare	10th	2708	0.06	0.23	792	0.49	0.50	2398	0.08	0.27
Parental Unemployment	10th	2670	0.14	0.35	778	0.24	0.43	2365	0.55	0.50
Any Stress	10th	2708	0.46	0.50	792	0.61	0.49	2398	0.60	0.49
Male	10th	2711	0.47	0.50	792	0.45	0.50	2402	0.46	0.50
Family Size	10th	2711	4.12	1.42	792	5.02	1.78	2402	4.65	1.46
Number of Older Siblings	10th	2711	1.23	1.31	792	1.47	1.58	2402	1.32	1.36
Maternal Education	10th	2711	12.69	2.69	792	11.43	2.44	2402	12.34	2.67
Maternal Age	10th	2711	39.87	5.83	792	39.66	6.91	2402	40.30	6.19
Reading Score	10th	2711	51.06	9.82	792	47.56	9.09	2402	51.22	9.80
Math Score	10th	2711	51.07	9.81	792	47.62	8.60	2402	51.08	9.96
Family Income (\$10,000s)	10th	2711	3.33	3.05	792	2.13	2.34	2402	3.43	2.84

Variable	Wave	Ever Divorced			Ever Welfare			Ever Unemployment		
		Obs	Mean	Std.	Obs	Mean	Std.	Obs	Mean	Std.
Black	10th	2711	0.13	0.33	792	0.21	0.41	2402	0.13	0.34
Hispanic	10th	2711	0.11	0.31	792	0.23	0.42	2402	0.15	0.36
Other Race	10th	2711	0.08	0.27	792	0.13	0.33	2402	0.10	0.30
Locus of Control	10th	2711	0.04	0.71	792	-0.12	0.77	2402	-0.01	0.73
Ever Dropout	10th	2711	0.11	0.31	792	0.18	0.38	2402	0.10	0.30
Missing Information	10th	2711	0.19	0.40	792	0.21	0.41	2402	0.19	0.39
Smoker	12th	2256	0.16	0.37	715	0.14	0.35	2005	0.14	0.34
Heavy Smoker	12th	2256	0.12	0.32	715	0.11	0.31	2005	0.10	0.30
Drink	12th	1460	0.40	0.49	519	0.32	0.47	1350	0.36	0.48
Binge Drink	12th	1752	0.29	0.45	580	0.33	0.47	1613	0.25	0.44
Divorce	12th	2242	0.38	0.49	710	0.16	0.37	1994	0.09	0.28
Welfare	12th	2233	0.09	0.29	712	0.73	0.44	1989	0.10	0.29
Parental Unemployment	12th	2256	0.07	0.25	715	0.14	0.35	2005	0.42	0.49
Any Stress	12th	2256	0.46	0.50	715	0.77	0.42	2005	0.53	0.50
Male	12th	2256	0.48	0.50	715	0.45	0.50	2005	0.47	0.50
Family Size	12th	2256	4.17	1.43	715	5.05	1.76	2005	4.68	1.48
Number of Older Siblings	12th	2256	1.20	1.32	715	1.46	1.56	2005	1.33	1.38
Maternal Education	12th	2256	12.71	2.69	715	11.38	2.45	2005	12.38	2.65
Maternal Age	12th	2256	39.90	5.86	715	39.86	7.12	2005	40.35	6.12
Reading Score	12th	2256	50.98	9.90	715	47.31	8.96	2005	51.33	9.84
Math Score	12th	2256	51.14	9.98	715	47.36	8.71	2005	51.28	10.13
Family Income (\$10,000s)	12th	2256	3.33	3.06	715	2.14	2.42	2005	3.42	2.81
Black	12th	2256	0.15	0.36	715	0.23	0.42	2005	0.15	0.36
Hispanic	12th	2256	0.12	0.33	715	0.24	0.43	2005	0.16	0.37
Other Race	12th	2256	0.08	0.27	715	0.14	0.35	2005	0.10	0.30
Locus of Control	12th	2256	0.05	0.70	715	-0.13	0.77	2005	0.02	0.71
Ever Dropout	12th	2256	0.10	0.30	715	0.19	0.39	2005	0.09	0.29
Missing Information	12th	2256	0.19	0.40	715	0.22	0.42	2005	0.18	0.39

Table 2A

Summary Results for Heavy Smokers

Outcome	Heavy Smoke	Heavy Smoke	Heavy Smoke	Heavy Smoke
Sample	Full	Full	Ever Stress	Ever Stress
Fixed Effects	None	School	None	School
Any Stress	1.343 *** (0.071)	1.363 *** (0.076)	1.251 *** (0.085)	1.218 *** (0.088)
Outcome	Heavy Smoke	Heavy Smoke	Heavy Smoke	Heavy Smoke
Sample	Full	Full	Ever Divorce	Ever Divorce
Fixed Effects	None	School	None	School

Divorce	1.604 *** (0.111)	1.593 *** (0.118)	1.422 *** (0.127)	1.328 *** (0.133)
Outcome	Heavy Smoke	Heavy Smoke	Heavy Smoke	Heavy Smoke
Sample	Full	Full	Ever Welfare	Ever Welfare
Fixed Effects	None	School	None	School
Welfare	1.110 (0.126)	1.128 (0.134)	0.870 (0.136)	0.773 (0.181)
Outcome	Heavy Smoke	Heavy Smoke	Heavy Smoke	Heavy Smoke
Sample	Full	Full	Ever Unemployed	Ever Unemployed
Fixed Effects	None	School	None	School
Parent Unemployed	1.243 *** (0.092)	1.269 *** (0.098)	1.188 * (0.114)	1.139 (0.127)

Robust standard errors clustered at school level. Full results available upon request

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Table 3A

Summary Results for Binge Drinking

Outcome	Binge	Binge	Binge	Binge
Sample	Full	Full	Ever Stress	Ever Stress
Fixed Effects	None	School	None	School
Any Stress	1.264 *** (0.054)	1.246 *** (0.056)	1.139 ** (0.061)	1.075 (0.065)
Outcome	Binge	Binge	Binge	Binge
Sample	Full	Full	Ever Divorce	Ever Divorce
Fixed Effects	None	School	None	School
Divorce	1.521 *** (0.090)	1.473 *** (0.094)	1.275 *** (0.093)	1.227 ** (0.111)
Outcome	Binge	Binge	Binge	Binge
Sample	Full	Full	Ever Welfare	Ever Welfare
Fixed Effects	None	School	None	School
Welfare	1.195 ** (0.098)	1.182 * (0.109)	1.040 (0.146)	1.046 (0.211)
Outcome	Binge	Binge	Binge	Binge
Sample	Full	Full	Ever Unemployed	Ever Unemployed
Fixed Effects	None	School	None	School
Parent Unemployed	1.073 (0.065)	1.030 (0.063)	1.011 (0.078)	0.911 (0.082)

Robust standard errors clustered at school level. Full results available upon request

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Table 4A

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between Divorce and Smoking Initiation Full Sample and “Ever Divorce” Sample

Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Divorce	Ever Divorce
Fixed Effects	None	School	None	School
Divorce	1.536*** (0.085)	1.498*** (0.088)	1.337*** (0.095)	1.291*** (0.101)
Male	1.004 (0.038)	0.973 (0.036)	1.001 (0.072)	0.949 (0.088)
Family Size	0.922*** (0.012)	0.932*** (0.013)	0.957* (0.025)	0.974 (0.033)
Number of Older Siblings	1.075*** (0.015)	1.085*** (0.016)	1.059* (0.032)	1.041 (0.037)
Maternal Education	1.013* (0.007)	1.003 (0.007)	1.000 (0.015)	0.978 (0.018)
Maternal Age	0.994* (0.003)	0.992** (0.003)	0.998 (0.007)	1.000 (0.009)
Reading Score	0.995** (0.003)	0.993** (0.003)	0.998 (0.005)	1.004 (0.007)
Math Score	0.981*** (0.003)	0.978*** (0.003)	0.984*** (0.005)	0.978*** (0.007)
Family Income	1.017*** (0.005)	0.999 (0.006)	1.016 (0.013)	1.010 (0.018)
Black	0.205*** (0.018)	0.190*** (0.021)	0.197*** (0.035)	0.159*** (0.039)
Hispanic	0.569*** (0.039)	0.712*** (0.055)	0.574*** (0.074)	0.820 (0.152)
Other Race	0.659*** (0.044)	0.728*** (0.050)	0.786* (0.108)	0.922 (0.157)
Locus of Control	0.782*** (0.021)	0.771*** (0.020)	0.822*** (0.044)	0.781*** (0.050)
Ever Drop out	2.896*** (0.162)	3.157*** (0.187)	2.673*** (0.275)	3.258*** (0.430)
Missing	0.939 (0.042)	0.922 (0.046)	0.949 (0.084)	0.982 (0.118)
Wave =1	0.219*** (0.044)	0.257*** (0.013)	0.165*** (0.065)	0.191*** (0.021)
Wave =2	0.837 (0.163)	1.060 (0.040)	0.636 (0.248)	0.927 (0.077)
Wave =3	0.767 (0.151)	1.047 (0.000)	0.582 (0.228)	1.131 (0.000)
Observations	41552	38841	7890	5600
Number of schoolid10		1065		598

Robust standard errors clustered at school level.

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Table 5A

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between Welfare and Smoking Initiation Full Sample and “Ever Welfare” Sample

Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Welfare	Ever Welfare
Fixed Effects	None	School	None	School
Welfare	1.112 (0.104)	1.086 (0.108)	0.868 (0.110)	0.930 (0.165)
Male	1.000 (0.037)	0.967 (0.035)	1.229 (0.169)	1.156 (0.280)
Family Size	0.920 *** (0.012)	0.933 *** (0.013)	0.941 (0.039)	0.935 (0.067)
Number of Older Siblings	1.078 *** (0.015)	1.087 *** (0.016)	1.085 * (0.050)	1.193 ** (0.100)
Maternal Education	1.013 * (0.008)	1.004 (0.007)	1.049 (0.031)	1.051 (0.059)
Maternal Age	0.993 ** (0.003)	0.991 *** (0.003)	0.984 (0.010)	0.979 (0.019)
Reading Score	0.995 ** (0.003)	0.993 *** (0.003)	0.990 (0.010)	0.995 (0.018)
Math Score	0.982 *** (0.003)	0.978 *** (0.003)	0.990 (0.011)	0.986 (0.021)
Family Income	1.017 *** (0.005)	0.997 (0.006)	1.003 (0.029)	0.983 (0.070)
Black	0.210 *** (0.019)	0.197 *** (0.022)	0.252 *** (0.051)	0.095 *** (0.054)
Hispanic	0.589 *** (0.040)	0.745 *** (0.057)	0.506 *** (0.094)	0.380 ** (0.174)
Other Race	0.654 *** (0.044)	0.721 *** (0.050)	0.449 *** (0.111)	0.391 * (0.192)
Locus of Control	0.783 *** (0.021)	0.771 *** (0.020)	0.877 (0.080)	0.660 ** (0.109)
Ever Drop out	2.810 *** (0.159)	3.062 *** (0.182)	2.150 *** (0.322)	4.610 *** (1.423)
Missing	0.970 (0.042)	0.953 (0.046)	1.073 (0.167)	0.697 (0.230)
Wave =1	0.234 *** (0.046)	0.267 (0.000)	0.267 * (0.184)	0.121 (0.000)
Wave =2	0.870 (0.169)	1.071 (0.050)	0.852 (0.582)	0.806 (0.180)
Wave =3	0.800 (0.157)	1.055 (0.052)	0.741 (0.502)	1.295 (0.329)
Observations	42227	39412	2414	1148
R-squared	.	.	.	.
Number of schoolid10		1059		215

Robust standard errors clustered at school level.

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Table 6A

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between Parental Unemployment and Smoking Initiation Full Sample and “Ever Unemployment” Sample

Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Unemployed	Ever Unemployed
Fixed Effects	None	School	None	School
Parent Unemployed	1.203 *** (0.071)	1.211 *** (0.077)	1.173 ** (0.089)	1.126 (0.100)
Male	0.995 (0.037)	0.966 (0.035)	1.050 (0.088)	1.053 (0.115)
Family Size	0.919 *** (0.012)	0.931 *** (0.013)	0.938 ** (0.028)	0.933 * (0.037)
Number of Older Siblings	1.075 *** (0.015)	1.083 *** (0.016)	1.048 (0.035)	1.007 (0.045)
Maternal Education	1.014 * (0.007)	1.005 (0.007)	1.026 (0.018)	1.001 (0.024)
Maternal Age	0.994 * (0.003)	0.992 ** (0.003)	0.987 * (0.008)	0.992 (0.010)
Reading Score	0.995 ** (0.003)	0.993 *** (0.003)	0.996 (0.006)	0.999 (0.008)
Math Score	0.981 *** (0.003)	0.977 *** (0.003)	0.975 *** (0.006)	0.966 *** (0.008)
Family Income	1.017 *** (0.005)	0.998 (0.006)	0.994 (0.016)	0.993 (0.026)
Black	0.206 *** (0.018)	0.195 *** (0.021)	0.230 *** (0.038)	0.157 *** (0.045)
Hispanic	0.571 *** (0.039)	0.722 *** (0.055)	0.487 *** (0.063)	0.542 *** (0.119)
Other Race	0.654 *** (0.044)	0.725 *** (0.050)	0.553 *** (0.088)	0.626 ** (0.133)
Locus of Control	0.781 *** (0.020)	0.770 *** (0.020)	0.841 *** (0.048)	0.799 *** (0.061)
Ever Drop out	2.897 *** (0.162)	3.153 *** (0.185)	2.511 *** (0.281)	3.057 *** (0.490)
Missing	0.967 (0.042)	0.957 (0.046)	0.998 (0.101)	1.035 (0.156)
Wave =1	0.237 *** (0.047)	0.270 (0.000)	0.348 ** (0.159)	0.170 *** (0.023)
Wave =2	0.857 (0.167)	1.060 (0.049)	1.392 (0.627)	0.906 (0.087)
Wave =3	0.789 (0.155)	1.049 (0.051)	1.235 (0.555)	1.174 (0.000)
Observations	42642	39800	6998	4246
R-squared	.	.	.	.
Number of schoolid10		1076		507

Robust standard errors clustered at school level.

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Table 7A

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between Any Stress and Drinking Initiation Full Sample and “Ever Any Stress” Sample

Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Stress	Ever Stress
Fixed Effects	None	School	None	School
Any Stress	1.233 *** (0.046)	1.230 *** (0.049)	1.130 *** (0.053)	1.071 (0.058)
Male	1.305 *** (0.037)	1.301 *** (0.040)	1.312 *** (0.062)	1.306 *** (0.077)
Family Size	0.935 *** (0.011)	0.946 *** (0.011)	0.940 *** (0.017)	0.979 (0.020)
Number of Older Siblings	1.088 *** (0.014)	1.091 *** (0.014)	1.065 *** (0.022)	1.061 ** (0.025)
Maternal Education	1.019 *** (0.006)	1.007 (0.006)	1.021 ** (0.010)	1.002 (0.012)
Maternal Age	0.994 ** (0.003)	0.991 *** (0.003)	0.994 (0.005)	0.993 (0.005)
Reading Score	0.991 *** (0.002)	0.991 *** (0.002)	0.994 * (0.004)	0.994 (0.004)
Math Score	0.997 (0.002)	0.991 *** (0.002)	0.998 (0.004)	0.993 (0.004)
Family Income	1.040 *** (0.005)	1.028 *** (0.005)	1.031 *** (0.009)	1.027 ** (0.012)
Black	0.474 *** (0.026)	0.493 *** (0.034)	0.511 *** (0.038)	0.502 *** (0.059)
Hispanic	0.862 *** (0.044)	0.879 ** (0.055)	0.764 *** (0.060)	0.765 ** (0.083)
Other Race	0.616 *** (0.033)	0.657 *** (0.037)	0.577 *** (0.049)	0.621 *** (0.067)
Locus of Control	0.957 ** (0.021)	0.939 *** (0.021)	1.000 (0.036)	0.985 (0.041)
Ever Drop out	1.511 *** (0.083)	1.580 *** (0.097)	1.368 *** (0.115)	1.344 *** (0.128)
Missing	1.005 (0.037)	0.959 (0.039)	0.960 (0.058)	0.992 (0.076)
Wave =1	1.151 (0.197)	0.969 (0.029)	1.128 (0.304)	0.937 (0.000)
Wave =2	1.095 (0.187)	1.056 (0.000)	0.993 (0.271)	1.100 * (0.059)
Observations	23026	22344	7506	6826
Number of Schools	.	.	.	.
R-squared		1117		873

Robust standard errors clustered at school level.

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Table 8A

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between Divorce and Drinking Initiation Full Sample and “Ever Divorce” Sample

Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Divorce	Ever Divorce
Fixed Effects	None	School	None	School
Divorce	1.410 *** (0.077)	1.392 *** (0.082)	1.171 ** (0.077)	1.112 (0.092)
Male	1.307 *** (0.037)	1.310 *** (0.041)	1.372 *** (0.086)	1.370 *** (0.120)
Family Size	0.935 *** (0.011)	0.946 *** (0.011)	0.984 (0.024)	1.043 (0.033)
Number of Older Siblings	1.088 *** (0.014)	1.090 *** (0.014)	1.066 ** (0.030)	1.035 (0.036)
Maternal Education	1.018 *** (0.006)	1.006 (0.006)	1.030 ** (0.013)	1.015 (0.018)
Maternal Age	0.995 * (0.003)	0.992 *** (0.003)	0.998 (0.006)	1.002 (0.008)
Reading Score	0.991 *** (0.002)	0.991 *** (0.002)	0.998 (0.005)	0.999 (0.006)
Math Score	0.997 (0.002)	0.991 *** (0.002)	0.995 (0.005)	0.982 *** (0.006)
Family Income	1.040 *** (0.005)	1.027 *** (0.005)	1.016 (0.011)	1.008 (0.017)
Black	0.484 *** (0.027)	0.500 *** (0.035)	0.487 *** (0.049)	0.468 *** (0.081)
Hispanic	0.876 ** (0.045)	0.882 ** (0.056)	0.739 *** (0.083)	0.666 ** (0.110)
Other Race	0.616 *** (0.034)	0.657 *** (0.037)	0.660 *** (0.076)	0.766 (0.124)
Locus of Control	0.953 ** (0.021)	0.934 *** (0.021)	0.987 (0.046)	0.983 (0.060)
Ever Drop out	1.514 *** (0.084)	1.593 *** (0.099)	1.413 *** (0.152)	1.355 ** (0.190)
Missing	0.999 (0.037)	0.949 (0.039)	0.949 (0.076)	0.931 (0.103)
Wave =1	1.150 (0.199)	0.983 (0.030)	0.771 (0.277)	0.779 *** (0.058)
Wave =2	1.083 (0.186)	1.055 (0.000)	0.684 (0.249)	1.104 (0.000)
Observations	22653	21985	4114	3385
Number of Schools	.	.	.	.
R-squared		1109		632

Robust standard errors clustered at school level.

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Table 9A

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between Welfare and Drinking Initiation Full Sample and “Ever Welfare” Sample

Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Welfare	Ever Welfare
Fixed Effects	None	School	None	School
Welfare	1.006 (0.079)	0.995 (0.084)	1.073 (0.131)	1.162 (0.214)
Male	1.298*** (0.037)	1.295*** (0.040)	1.338** (0.155)	1.221 (0.270)
Family Size	0.933*** (0.011)	0.944*** (0.011)	0.938 (0.036)	1.070 (0.070)
Number of Older Siblings	1.090*** (0.014)	1.092*** (0.014)	0.959 (0.043)	0.920 (0.070)
Maternal Education	1.019*** (0.006)	1.006 (0.006)	0.994 (0.028)	0.919* (0.045)
Maternal Age	0.993** (0.003)	0.991*** (0.003)	0.990 (0.009)	0.996 (0.017)
Reading Score	0.991*** (0.002)	0.991*** (0.002)	0.991 (0.009)	1.006 (0.017)
Math Score	0.997 (0.002)	0.991*** (0.002)	1.002 (0.010)	0.979 (0.020)
Family Income	1.039*** (0.005)	1.026*** (0.005)	1.035 (0.028)	1.009 (0.062)
Black	0.481*** (0.026)	0.497*** (0.035)	0.619*** (0.102)	0.292** (0.145)
Hispanic	0.876*** (0.045)	0.884** (0.055)	0.765 (0.131)	0.485* (0.194)
Other Race	0.620*** (0.034)	0.658*** (0.037)	0.392*** (0.088)	0.182*** (0.085)
Locus of Control	0.954** (0.021)	0.934*** (0.021)	1.117 (0.095)	1.299* (0.198)
Ever Drop out	1.513*** (0.084)	1.585*** (0.098)	1.187 (0.187)	1.079 (0.284)
Missing	1.004 (0.037)	0.956 (0.039)	1.140 (0.165)	1.109 (0.349)
Wave =1	1.235 (0.211)	0.973 (0.029)	1.782 (1.121)	0.495*** (0.078)
Wave =2	1.171 (0.199)	1.056 (0.000)	1.522 (0.962)	1.013 (0.000)
Observations	22917	22240	1309	735
Number of Schools	.	.	.	.
R-squared		1116		196

Robust standard errors clustered at school level.

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Table 10A

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between Parental Unemployment and Drinking Initiation Full Sample and “Ever Unemployment” Sample

Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Unemployed	Ever Unemployed
Fixed Effects	None	School	None	School
Parent Unemployed	1.178 *** (0.059)	1.162 *** (0.062)	1.144 * (0.081)	1.074 (0.086)
Male	1.311 *** (0.037)	1.313 *** (0.041)	1.317 *** (0.091)	1.407 *** (0.137)
Family Size	0.934 *** (0.011)	0.945 *** (0.011)	0.958 * (0.024)	1.010 (0.035)
Number of Older Siblings	1.088 *** (0.014)	1.090 *** (0.014)	1.092 *** (0.033)	1.089 ** (0.042)
Maternal Education	1.019 *** (0.006)	1.006 (0.006)	1.030 *** (0.015)	0.993 (0.020)
Maternal Age	0.994 ** (0.003)	0.991 *** (0.003)	0.989 (0.007)	0.992 (0.009)
Reading Score	0.991 *** (0.002)	0.991 *** (0.002)	0.991 * (0.005)	0.989 (0.007)
Math Score	0.997 (0.002)	0.991 *** (0.002)	0.998 (0.005)	0.997 (0.007)
Family Income	1.040 *** (0.005)	1.027 *** (0.005)	1.038 *** (0.013)	1.079 *** (0.023)
Black	0.484 *** (0.027)	0.502 *** (0.035)	0.538 *** (0.057)	0.432 *** (0.090)
Hispanic	0.872 *** (0.044)	0.876 ** (0.055)	0.790 ** (0.086)	0.742 * (0.133)
Other Race	0.617 *** (0.033)	0.658 *** (0.037)	0.593 *** (0.069)	0.546 *** (0.097)
Locus of Control	0.954 ** (0.021)	0.937 *** (0.021)	0.973 (0.050)	0.981 (0.069)
Ever Drop out	1.551 *** (0.086)	1.620 *** (0.100)	1.244 * (0.147)	1.313 * (0.212)
Missing	1.002 (0.037)	0.954 (0.039)	0.954 (0.085)	1.073 (0.140)
Wave =1	1.217 (0.208)	0.978 (0.029)	1.206 (0.459)	0.719 *** (0.058)
Wave =2	1.153 (0.196)	1.055 (0.000)	1.077 (0.416)	1.085 (0.000)
Observations	22744	22073	3716	2841
Number of Schools	.	.	.	.
R-squared		1111		579

Robust standard errors clustered at school level.

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Table 1

Descriptive Statistics for Primary Analytic Sample * National Education Longitudinal Study

Wave (Grade):	8 th		10 th		12 th	
Variable	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Observations	N~16,673		N~14,473		N~12,474	
Smoker	0.05	0.21	0.14	0.35	0.13	0.33
Heavy Smoker	0.02	0.12	0.09	0.28	0.09	0.29
Drink			0.38	0.49	0.36	0.48
Binge Drink			0.22	0.42	0.23	0.42
Divorce	0.11	0.31	0.07	0.25	0.07	0.25
Welfare	0.02	0.14	0.03	0.16	0.04	0.20
Parental Unemployment	0.04	0.19	0.09	0.29	0.07	0.25
Any Stress	0.14	0.35	0.16	0.37	0.16	0.37
Male	0.49	0.50	0.48	0.50	0.49	0.50
Family Size	4.63	1.40	4.60	1.38	4.64	1.39
Number of Older Siblings	1.26	1.31	1.25	1.31	1.23	1.30
Maternal Education	12.77	2.77	12.82	2.77	12.83	2.77
Maternal Age	40.86	6.05	40.87	6.01	40.91	6.02
Reading Score ^a	51.45	9.94	52.00	9.90	52.12	9.98
Math Score ^b	51.79	10.18	52.33	10.18	52.47	10.31
Family Income (\$10,000s)	4.38	3.61	4.44	3.64	4.43	3.62
Black	0.10	0.30	0.09	0.29	0.11	0.31
Hispanic	0.12	0.32	0.11	0.31	0.12	0.32
Other Race	0.10	0.30	0.10	0.29	0.10	0.30
Locus of Control ^c	0.05	0.71	0.08	0.69	0.10	0.69
Ever Dropout	0.08	0.27	0.07	0.25	0.06	0.24
Missing Information	0.21	0.40	0.20	0.40	0.20	0.40

* As indicated in the text, questions on alcohol consumption are asked only in Waves 2–3 so the analytic sample for alcohol is smaller than for smoking.

^aReading score ranges from 31.75 to 70.55

^bMath score ranges from 33.9 to 77.2

^cLocus of control ranges from –3.01 to 1.52

Table 2

Logistic Regression Analysis of Discrete Time Hazard Model Relationship between “Any Stress” and Smoking Initiation Full Sample and “Ever Stress” Sample

Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Stress	Ever Stress
Fixed Effects	None	School	None	School
Any Stress	1.300 *** (0.054)	1.294 *** (0.058)	1.215 *** (0.064)	1.190 *** (0.068)
Male	0.995 (0.037)	0.960 (0.035)	1.016 (0.058)	0.971 (0.064)
Family Size	0.926 *** (0.012)	0.940 *** (0.013)	0.936 *** (0.019)	0.956 * (0.022)
Number of Older Siblings	1.075 *** (0.015)	1.083 *** (0.016)	1.056 ** (0.024)	1.050 * (0.027)
Maternal Education	1.014 ** (0.007)	1.005 (0.007)	1.011 (0.012)	1.002 (0.014)
Maternal Age	0.994 ** (0.003)	0.992 ** (0.003)	0.992 (0.005)	0.993 (0.006)
Reading Score	0.995 * (0.003)	0.993 *** (0.003)	0.997 (0.004)	0.996 (0.005)
Math Score	0.981 *** (0.003)	0.977 *** (0.003)	0.981 *** (0.004)	0.977 *** (0.005)
Family Income	1.018 *** (0.005)	1.000 (0.006)	1.013 (0.010)	0.995 (0.014)
Black	0.202 *** (0.018)	0.192 *** (0.021)	0.210 *** (0.025)	0.179 *** (0.030)
Hispanic	0.568 *** (0.038)	0.730 *** (0.055)	0.508 *** (0.048)	0.684 *** (0.088)
Other Race	0.655 *** (0.044)	0.735 *** (0.050)	0.651 *** (0.068)	0.790 ** (0.095)
Locus of Control	0.782 *** (0.020)	0.771 *** (0.020)	0.810 *** (0.033)	0.779 *** (0.035)
Ever Drop out	2.774 *** (0.154)	3.044 *** (0.177)	2.585 *** (0.204)	3.032 *** (0.283)
Missing	0.972 (0.041)	0.965 (0.046)	0.988 (0.068)	0.961 (0.083)
Wave =1	0.225 *** (0.044)	0.271 (0.000)	0.251 *** (0.077)	0.243 (0.000)
Wave =2	0.812 (0.157)	1.063 (0.049)	0.903 (0.272)	1.037 (0.079)
Wave =3	0.747 (0.145)	1.051 (0.050)	0.799 (0.241)	1.111 (0.090)
Observations	43568	40695	14396	11386
R-squared	.	.	.	.
Number of schoolid10		1088		788

Robust standard errors clustered at school level

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Table 3

Logistic Regression Analysis of Discrete Time Hazard Model The Effects of Stress on Smoking Initiation

Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Stress	Ever Stress
Fixed Effects	None	School	None	School
Any Stress. Row 1.	1.300 *** (0.054)	1.294 *** (0.058)	1.215 *** (0.064)	1.190 *** (0.068)
Observations	43,568	40,685	14,396	11,386
Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Divorce	Ever Divorce
Fixed Effects	None	School	None	School
Divorce Row 2.	1.536 *** (0.085)	1.498 *** (0.088)	1.337 *** (0.095)	1.291 *** (0.101)
Observations	41,551	38,841	7,890	5,600
Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Welfare	Ever Welfare
Fixed Effects	None	School	None	School
Welfare Row 3.	1.112 (0.104)	1.086 (0.108)	0.868 (0.110)	0.930 (0.165)
Observations	42,227	39,412	2,414	1,148
Outcome	Smoke	Smoke	Smoke	Smoke
Sample	Full	Full	Ever Unemployed	Ever Unemployed
Fixed Effects	None	School	None	School
Parent Unemployed. Row 4.	1.203 *** (0.071)	1.211 *** (0.077)	1.173 ** (0.089)	1.126 (0.100)
Observations	42,642	39,800	6,998	4,246

Robust standard errors clustered at school level. See Appendix 4A–6A for full results and list of control variables.

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Table 4

Logistic Regression Analysis of Discrete Time Hazard Model The Effects of Stress on Drinking Initiation

Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Stress	Ever Stress
Fixed Effects	None	School	None	School
Any Stress. Row 1.	1.233 *** (0.046)	1.230 *** (0.049)	1.130 *** (0.053)	1.071 (0.058)
Observations	23,026	22,344	7,506	6,826
Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Divorce	Ever Divorce
Fixed Effects	None	School	None	School
Divorce. Row 2.	1.410 *** (0.077)	1.392 *** (0.082)	1.171 ** (0.077)	1.112 (0.092)
Observations	22,653	21,985	4,114	3,385
Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Welfare	Ever Welfare
Fixed Effects	None	School	None	School
Welfare. Row 3.	1.006 (0.079)	0.995 (0.084)	1.073 (0.131)	1.162 (0.214)
Observations	22,917	22,240	1,309	735
Outcome	Drink	Drink	Drink	Drink
Sample	Full	Full	Ever Unemployed	Ever Unemployed
Fixed Effects	None	School	None	School
Parent Unemployed. Row 4.	1.178 *** (0.059)	1.162 *** (0.062)	1.144 * (0.081)	1.074 (0.086)
Observations	22,744	22,073	3,716	2,841

Robust standard errors clustered at school level. See Appendix 7A–10A for full results and list of control variables.

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