Development and Psychopathology **30** (2018), 315–335

doi:10.1017/S0954579417000645

Adolescents from upper middle class communities: Substance misuse and addiction across early adulthood

SUNIYA S. LUTHAR, PHILLIP J. SMALL, AND LUCIA CICIOLLA
Arizona State University

Abstract

In this prospective study of upper middle class youth, we document frequency of alcohol and drug use, as well as diagnoses of abuse and dependence, during early adulthood. Two cohorts were assessed as high school seniors and then annually across 4 college years (New England Study of Suburban Youth younger cohort [NESSY-Y]), and across ages 23–27 (NESSY older cohort [NESSY-O]; *ns* = 152 and 183 at final assessments, respectively). Across gender and annual assessments, results showed substantial elevations, relative to norms, for frequency of drunkenness and using marijuana, stimulants, and cocaine. Of more concern were psychiatric diagnoses of alcohol/drug dependence: among women and men, respectively, lifetime rates ranged between 19%–24% and 23%–40% among NESSY-Os at age 26; and 11%–16% and 19%–27% among NESSY-Ys at 22. Relative to norms, these rates among NESSY-O women and men were three and two times as high, respectively, and among NESSY-Y, close to one among women but twice as high among men. Findings also showed the protective power of parents' containment (anticipated stringency of repercussions for substance use) at age 18; this was inversely associated with frequency of drunkenness and marijuana and stimulant use in adulthood. Results emphasize the need to take seriously the elevated rates of substance documented among adolescents in affluent American school communities.

The United States continues to experience an epidemic of drug overdose deaths. From 2000 to 2015 more than half a million people died from drug overdoses, the majority (55% of these deaths) occurring from 2009 to 2015 . . . Large suburban metro counties went from having the lowest to the highest rate of premature death due to drug overdose within the past decade. Premature death due to drug overdose was highest among whites (778 years of potential life lost per 100,000). (Givens, Gennuso, Jovaag, & Van Dijk, 2017, p. 6)

Over the last two decades, studies have documented more frequent drug and alcohol use among upper middle class teens than their less well-off counterparts, but what remains unclear is the degree to which this might eventuate in serious problems of addiction. In this paper, we present adult data on two cohorts from schools in predominantly affluent communities. Both cohorts were initially assessed as high school seniors, with one subsequently assessed annually at ages 23–27, and the second across the 4 years of college at ages 19–22 years. For women and men separately, we document frequency of using different substances and psychiatric diagnoses of abuse as well as dependence, relative to national normative data.

Substance Misuse Among Upper Middle Class Youth

In 2009, an editorial in the *Journal of the American Academy of Child & Adolescent Psychiatry* declared affluent youth to be a "newly identified at-risk group" (Koplewicz, Gurian, & Williams, 2009, p. 1053), and over time, studies have confirmed that substance misuse is a problem of particular concern (Botticello, 2009; Luthar & Barkin, 2012; Luthar & D'Avanzo, 1999; Patrick, Wightman, Schoeni, & Schulenberg, 2012). Researchers have documented high binge drinking and marijuana use in neighborhoods with mostly well-educated, wealthy, White families (Reboussin, Preisser, Song, & Wolfson, 2010; Song et al., 2009). Similar patterns are seen in highly achieving schools, which serve mostly affluent students (as home prices typically rise with schools' standardized test scores; Bui & Dougherty, 2017). Studies have recurrently shown elevated substance use levels, compared to national norms, among students at high-achieving public and independent schools, in the suburbs and cities, and across different parts of the country (for a review, see Luthar, Barkin, & Crossman, 2013).

Consistent findings have been reported in analyses of large, national data sets. In a nationally representative sample of over 13,000 US youth, Coley, Sims, Dearing, and Spielvogel (2017) found that attendance at schools with a high proportion of affluent schoolmates was associated with significantly higher likelihood of both intoxication and use of illicit drugs (marijuana, cocaine, and other illegal drugs).

This paper is dedicated to the memory of Samuel H. Barkin, deeply cherished student and collaborator. We are deeply grateful to the young adults who generously gave of their time and perspectives over the many years of this study and for funding by the National Institutes of Health (R01DA014385, R13 MH082592). We are also thankful for the contributions of master's and doctoral students in Dr. Luthar's prior lab at Teachers College, Columbia University, and to Nina L. Kumar.

Address correspondence and reprint requests to: Suniya S. Luthar, Department of Psychology, Arizona State University, 950 South McAllister Avenue, Tempe, AZ 85287-1104; E-mail: suniya.luthar@asu.edu.

In similar analyses of data in Norway, Lund, Dearing, and Zachrisson (2017) established links between school-level affluence and students' drinking to intoxication: boys and girls at the most affluent schools were about two and half times more likely to report such abuse of alcohol than those at the poorest schools, mirroring prior findings in the United States (Luthar & D'Avanzo, 1999; Lyman & Luthar, 2014).

Maturing Out?

Despite evidence of high substance use in affluent high schools, little is known about the evolution of alcohol and drug use after high school graduation. In contemporary times, after the early or "emerging" adulthood years roughly spanning ages 18–25 (Arnett, 2007), youth tend to mature out of deviant behaviors linked with adolescence including misuse of drugs and alcohol (Arnett, 2005). To illustrate, Schulenberg and Zarrett (2006) showed that binge drinking and marijuana use declined at approximately age 21 or 22, and Jackson, Sher, Gotham, and Wood (2001) documented maturation toward less severe drinking by the age of 24 years.

Youth in relatively affluent communities may not show these patterns of maturing out for at least two reasons. First, many in this demographic begin to use substances in preadolescence (Luthar & Barkin, 2012; Luthar & Goldstein, 2008), and early substance use is a strong predictor of long-term continued use (Moss, Chen, & Yi, 2014). Longitudinal research has shown that the incidence of adult alcohol dependence was over 10% among those who started drinking (more than two drinks per week) at age 13, as compared to 2% who started at age 18 (Grant, Stinson, & Harford, 2001).

Second, almost all high school seniors in affluent settings go on to attend college (e.g., Dreier, 2014; Pell Institute, 2015) and among contemporary college students, mores in the peer culture often actively support drinking and drug use (e.g., LaBrie, Hummer, & Pedersen, 2007; O'Hara, Armeli, & Tennen, 2015). Across the college years, inebriation not only is normative at social gatherings but also is often desirable (Chase, 2008; Marano, 2005), and studies have revealed binge-drinking rates as high as 44% among undergraduates (Wechsler et al., 2002; Wechsler & Nelson, 2008). Moreover, harmful drinking habits have been found to be more pronounced in college students from well-educated, affluent families, at least in part because they have more disposable income while at the same time living away from parent vigilance (Dantzer, Wardle, Fuller, Pampalone, & Steptoe, 2006; Rose, Smith, & Segrist, 2010; see also Carrick, 2016; Hussey & Schlossberg, 2015; Schiffman, 2011).

Whereas these trends may apply across all 4 years of college, it is possible that there are at least modest reductions in substance use around the time of graduation. During the first or second year of college, experimentation with alcohol and drugs can be high given freedom from parental supervision (Turrisi, Wiersma, & Hughes, 2000); some also drink or use drugs to conform to a new peer group and to ease social anxiety (LaBrie et al., 2007; O'Hara et al., 2015; Reifman & Watson, 2003; Turrisi et al., 2000). Closer to the time of graduation, however, it is plausible that overall use levels are reduced given attention, for example, to securing full-time employment (see Shulenberg & Zarrett, 2006; Steinman, 2003; Turrisi et al., 2000).

Following college graduation, similarly, it is possible that use levels may remain somewhat elevated in the first year or so, and declines become apparent several years later as these youth approach their late 20s (Chen & Jacobson, 2013). Studies have shown that even after the college years, drinking to get drunk is common in social gatherings (Maggs & Schulenberg, 2004), and hard drugs such as cocaine are used as well (White, Becker-Blease, & Grace-Bishop, 2006). Affiliation with deviant peers, who routinely binge drink and use drugs, can therefore reinforce substance misuse among these young people through the mid-20s (Andrews, Tildesley, Hops, & Li, 2002; Mason & Spoth, 2011; Schulenberg & Zarrett, 2006). By the later 20s, in contrast, substance use should, in theory, be reduced as a result of social role transitions, including full-time employment and family formation roles such as long-term, committed relationships (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Glatz, Stattin, & Kerr, 2012).

The New England Study of Suburban Youth (NESSY)

With a focus on youth who grew up in affluent suburbs, we report on patterns of substance use across a period of 10 adult years in a prospective, longitudinal design with two cohorts. The first cohort was assessed from sixth grade through high school (Luthar & Barkin, 2012), and here we present data at Grade 12 and then across the 5 years after college graduation, through the ages of 23 to 27 years. The second cohort was first assessed in Grade 12 and then followed through their 4 years of college, across the ages of 18–22. In this report, we refer to these two respective cohorts as NESSY older (NESSY-O) and NESSY younger (NESSY-Y). Both schools sampled were in communities with a high concentration of well-educated, white-collar professionals, with median incomes in the top 5% of the country, from two different states in the Northeastern United States.

Based on annual assessments in adulthood, we expected to see elevated frequencies, compared to national norms, for at least four use indices: drunkenness, and the use of marijuana, stimulants such as Adderall or Ritalin, and cocaine. As noted earlier, elevated alcohol and marijuana use have already been documented among high school youth in affluent communities, and past use is a good predictor of later use. Studies have increasingly reported high misuse among college students of stimulant drugs such as Ritalin and Adderall, both as study aids and for recreational use, with reported rates as high as 20%–35%, and acquisition easy either from friends or through black-market sales on college campuses (Gendaszek & Low, 2002; Moore, Burgard, Larson, & Ferm, 2014; Vrecko, 2015). Finally, cocaine is also more commonly used by young adults from high socioeconomic status (SES) families than others, whereas in general, use of cigarettes and other drugs (e.g., inhalants, methamphetamines, and heroin), are more used

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

among lower SES individuals (Humensky, 2010; Lee, McClernon, Kollins, Prybol, & Fuemmeler, 2013).

Psychiatric Diagnoses: Does Frequent Use Imply Impairment?

Percentages reporting some use of a substance per year do not necessarily imply serious disorders; even if twice as many upper middle class youth report using a substance as their less wealthy counterparts, this may not entail functional impairment (see Uestuen & Kennedy, 2009). In this paper, therefore, we go beyond reporting on the percentages using substances relative to national norms (per data from Monitoring the Future; Johnston, O'Malley, Bachman, & Schulenberg, 2012). Here we also report on the proportions of the sample that met criteria for psychiatric diagnoses, based on structured interviews, of substance abuse and dependence. Broadly speaking, diagnoses of abuse imply levels of use that lead to failure to fulfill major role obligations, or problems with the law, without meeting criteria for dependence. The latter is the more serious diagnosis, encompassing the medical term for what is commonly referred to as alcoholism or addiction, involving physical tolerance, craving, and withdrawal symptoms when use is reduced.

For both NESSY-Y and NESSY-O, diagnoses were made based on criteria in the DSM–IV (American Psychiatric Association, 1994), the version of the diagnostic manual current at the time participants were enrolled in the study. Alongside, we present national normative rates for individuals of the same age using data from the National Comorbidity Study Replication (NCS-R), a nationally representative survey implemented between 2001 and 2003 with individuals 18 years and older, where rates of diagnoses were also based on structured interviews (Kessler et al., 2004).

In this paper, we report on lifetime rates in the NESSY cohorts using two sets of estimates. The first set is based on diagnostic interviews conducted at a single assessment time as was done in the NCS-R. This was the last interview with each cohort, at age 26 for NESSY-O (age 27 assessments encompassed the questionnaires but not interviews; see Methods) and age 22 for NESSY-Y. The second set of rates is based on lifetime diagnoses obtained cumulatively, across any of the annual NESSY interviews conducted. Several studies have established that single, cross-sectional assessments of mental disorders underestimate true lifetime rates, given limitations of retrospective recall across several years (Moffitt et al., 2010; Olino et al., 2012; Takayanagi et al., 2014). Thus, for both cohorts, we also present lifetime rates based on all four annual assessments, such that a positive diagnosis at any of these indicated a lifetime diagnosis.

Parent Containment

A final aim in this study was to examine the protective power of adolescents' perceived parents' "containment" in relation to long-term substance misuse. Containment represents views of the seriousness of repercussions from parents if they were to discover the youth's use of drugs or alcohol. Cross-sectionally and across multiple affluent school samples, low perceived parent containment has been found to have robust links with teenagers' actual use, over and above conventionally examined aspects of parents' supervision or monitoring (Luthar & Barkin, 2012). As this single construct explained much more variance than other parent predictors, researchers have underscored the need for upper middle class parents to avoid laxness when detecting teen substance use, in order to mitigate high levels of misuse in the future (Luthar et al., 2013).

Whereas such cautions may be reasonable, there is only limited evidence that high school parent containment has any ramifications for youths' substance use past the time that they no longer live at home. In a prospective study of 339 high school students in the Southwest, parental containment and parent–child relationship quality were examined in relation to alcohol use over the college transition (Hartman et al., 2016). Again, given overlap between the constructs of parental monitoring and containment, parental monitoring was included as a covariate. Results showed that higher parental containment was associated with less alcohol use in college, especially in the context of more positive, supportive parent–child relationships, mirroring findings that authoritative parenting is generally beneficial whereas authoritarian parenting is not (Cohen & Rice, 1997; Hoffmann & Bahr, 2014; Visser, de Winter, Vollebergh, Verhulst, & Reijneveld, 2013). The authors concluded that the construct of containment can have "important implications for parental efforts to reduce risk for alcohol use and related problems prior to the important transition to college, during which rates of heavy drinking and related problems often dramatically increase" (Hartman et al., 2016).

In this study, therefore, we examined, using longitudinal data, whether parents' containment in high school might have any prognostic significance for frequency of substance use well into adulthood. In these prospective analyses (as in prior cross-sectional work), we controlled for overall parental monitoring in high school, toward illuminating links largely specific to containment. Outcomes examined were frequencies on three use indices: drunkenness, marijuana use, and stimulants use. This choice was based on anticipated range of scores, wherein enough individuals would likely report using at least once, and some with high frequency scores, such that floor effects (with mostly zeros) could be avoided. These three indicators were considered, again, in the last year of adult assessments. In addition, assuming these associations were identified, we sought to determine whether they might be mediated by overall substance use during high school, while these young people had still been living at home.

Summary

In this cross-lagged longitudinal study, the central goal was to provide in-depth data on adult substance use among a population recently identified as being "at risk," that is, youth who

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

grow up in relatively affluent communities. We document levels of alcohol and drug use in two cohorts both assessed as high school seniors, and then annually across 4 college years (NESSY-Y), and across 5 years of young adulthood from ages 23 to 27 years (NESSY-O). In comparison with national norms, we expected to see (a) high rates of drinking to intoxication, and the use of marijuana, stimulants, and cocaine; and (b) modest reductions in rates, relative to prior use, by the senior year of college in NESSY-Y and by age 27 years in NESSY-O. A second goal was to compare rates of lifetime diagnoses of abuse or dependence relative to national norms, at ages 22 and 26 for NESSY-Y and NESSY-O, respectively. Finally, we sought to examine whether parental containment of substance use in high school was related to frequency of substance use several years later in adulthood, with high school use as a potential mediator. All analyses were conducted separately by gender, as prior work with affluent youth has shown gender differences in specific areas of maladjustment as well as in salient risk and protective processes (e.g., substance use shows robust links with high peer status among males but not among females; Luthar et al., 2013).

Methods

Sample

Originally encompassing only one cohort of students in a relatively affluent Northeastern suburb, this study evolved into a two-cohort design. The first cohort, NESSY-O, was followed annually from Grade 6 through freshman year of college (eight assessments, between 1998 and 2005; see Luthar & Barkin, 2012), and then again, after college graduation, between the ages of 23 and 27 (five assessments, between 2009 and 2013). Because data collection with NESSY-O was unavoidably stopped between 2006 and 2009, the second cohort (NESSY-Y) was recruited for this study to (a) capture trends among suburban youth across the critical college years of ages 19–22, and (b) potentially, to establish generalizability of young adult findings across two sites.

This report is the first to present on any data past the high school years on the NESSY-O cohort, and the first to present any data at all on the NESSY-Y cohort. In high school assessments of both samples, participation had been voluntary, and 71% and 70% of the graduating classes participated in the senior year assessments ($ns = 255$ and 272, respectively). Approximately half of the participants were female (48% and 54% in NESSY-O and NESSY-Y, respectively). Most students were White (88% and 80%), and the majority of parents had a college degree (83% and 90% for fathers and 83% and 88% for mothers in NESSY-O and NESSY-Y, respectively). Median family incomes were well over three times the national average in 2014 of $52,250, at $151,771 and $241,453 in the two towns, and median home prices in 2015 were both over $1 million (United States Bureau of the Census, 2015).

With regard to retention, the number of participants assessed at each wave is shown for both cohorts in Table 1. Note that at each wave, students were invited to join even if they had not participated in preceding waves of data collection. As shown in Table 1, at the final wave of data collection, we assessed 72% of NESSY-O youth who participated as high school seniors (age 27 years: 183 of 255 participants), and 56% of NESSY-Y youth (age 22 years: 152 of 272 participants). Whereas retention rates were lower for NESSY-Y, they compare favorably to other follow-up studies of substance use among high school students. For example, the Monitoring the Future (MTF) study reported retention rates for high school seniors ranging from 50% to 54% for the first year after high school through the fifth year after high school (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014).

To test for attrition biases, we compared Grade 12 scores on substance use between participants at the final year of data collection with their counterparts who had dropped out after high school assessments. In both NESSY-O and

Table 1. *The New England Study of Suburban Youth (NESSY): Two cohort longitudinal design*

	NESSY Older			NESSY Younger		
	Academic Year	Median Age (years)	*n*	Academic Year	Median Age (years)	*n*
High school Grade 12	2004–2005	18	255	2009–2010	18	272
College						
Year 1	2005–2006	19	—	2010–2011	19	136
Year 2	2006–2007	20	—	2011–2012	20	154
Year 3	2007–2008	21	—	2012–2013	21	160
Year 4	2008–2009	22	—	2013–2014	22	152
Postcollege						
Year 1	2009–2010	23	147			
Year 2	2010–2011	24	160			
Year 3	2011–2012	25	169			
Year 4	2012–2013	26	175			
Year 5	2013–2014	27	183			

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

NESSY-Y, final year participants versus nonparticipants were not significantly different on overall substance use as high school seniors, F (1, 249) = 0.40, *ns* and F (1, 264) = 0.63, *ns*. Further analyses showed, in addition, that there were no significant differences for specific substance use categories, participant race, parents' marital status, mother and father education levels, mother and father employment status, and number of hours/week parents worked outside the home. Thus, the adult prospective samples appear to be generally representative of the original NESSY-O and NESSY-Y cohorts as high school seniors, with no evidence to suggest differential attrition.

Procedure

In the high school senior year, data collection occurred during the month of May for both cohorts. Students' participation was voluntary and based on passive consent procedures, as the study was part of school-based initiatives promoting positive youth development. Participants completed a packet of questionnaires administered in a group setting, with research assistants available to answer any questions that arose. In Grade 12 assessments, participants received monetary incentives of a $30 gift card for NESSY-O (who had already participated in prior school-based assessments) and a $10 gift card for NESSY-Y (for whom this was the first assessment).

In subsequent annual adult assessments, data were collected via two processes: phone interviews for psychiatric diagnoses and online questionnaires in an extensive battery of self-report measures including those on substance use. Of the five adult assessments of NESSY-O, the first four (ages 23, 24, 25, and 26 years) involved the complete battery with psychiatric interviews for diagnoses as well as all questionnaires, whereas in the last assessment (age 27), project funds were available only for the questionnaire part of the study. Thus, diagnostic data are presented through age 26 but use data are available at age 27 as well. The second cohort, NESSY-Y, received the complete battery of assessments across four annual assessments, so that data on both diagnoses and use are available for ages 19, 20, 21, and 22. For NESSY-O adult assessments, incentives for completing both interview and online assessments were $150 at each wave; for their final wave where only questionnaires were completed, participants received $75. On completion of both parts of the study, NESSY-Y participants received $125 for participation during college freshman year, and $150 in subsequent years.

Measures

Substance use: Prevalence rates and frequencies. Participants completed questions from the MTF (Johnston et al., 2012) study about the use of alcohol and different substances. The reliability and validity of this type of self-report have been amply documented (http://www.monitoringthefuture.org). For each substance, participants indicated use both for the past year and the past 30 days, and in this paper, we present rates of any past-year use because for some substances (i.e., those rarely used), normative data for the past 30 days are not available. In addition, we considered past-year rates more reliable than those in the past month, as participants were assessed at different times in the year, and events (e.g., final exams or football season in college) could have skewed some 30-day use patterns.

Clinical diagnoses. Trained research assistants with bachelor's degrees administered the Computerized Diagnostic Interview Schedule for the DSM-IV (Robins et al., 2000) to subjects via telephone. The Computerized Diagnostic Interview Schedule for the DSM-IV is a structured interview that can be administered by lay interviewers and assesses lifetime and past-year symptoms according to the DSM-IV. All responses are precoded, and the measure has good reliability and criterion validity (Robins et al., 2000). In this study, we report on lifetime DSM-IV diagnoses of both abuse and dependence for alcohol and drugs. Criteria for drug abuse and dependence are parallel to those for alcohol abuse and dependence.

As noted earlier, lifetime diagnoses in both NESSY cohorts are compared here to normative rates from the NCS-R survey (Kessler et al., 2004), wherein DSM-IV diagnoses were obtained via a structured interview also administered by trained lay interviewers, using laptop computers. The interview used in the NCS-R was the Composite International Diagnostic Interview, which is similar to the Diagnostic Interview Schedule but was designed to produce diagnoses based on criteria of both DSM-IV and ICD-10 (National Comorbidity Study, 2005). To ensure comparability with our sample, we used the DSM-IV rates.

In the national NCS-R study, completed from 2001 to 2003, researchers had recruited participants from US households in different geographic regions, and had chosen one adult member of the household randomly, for a total of 9,836 interviews of English-speaking adults to determine diagnosis. Rates were then appropriately weighted to adjust for differential probabilities of selection for the national survey, as some groups of respondents were undersampled (e.g., based on sociodemographic and geographic variables; see Kessler et al., 2004). Accordingly, the NCS-R prevalence rates we used, shown in the present tables, were calculated using the same weighting criteria as were used in the NCS-R study, to derive national lifetime rates, by gender, and at the specific ages that corresponded to our NESSY-Y (age 22) and NESSY-O (age 26) samples. These conversions were done by using SAS survey procedures (Version 9.1.5, SAS Institute Inc.).

As previously indicated, we report on two sets of lifetime diagnoses in our NESSY cohorts. The first is based on the last assessment point only for each sample, as NCS-R rates were based on a single interview. The second set of NESSY lifetime rates are based on diagnoses received across all annual interviews, a method that both corrects for underestimation

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

due to retrospective recall spanning several years and takes into account data from all participants, whether or not they were interviewed in the last year of the study, specifically.

Parent containment of substance use: 12th grade. With responses rated on a 5-point scale, students were asked, "How serious would the repercussions from your parents be if they found out that you . . . Attended a keg or drinking party without permission; Got drunk; Went to a party where no adults were present without permission; Were smoking marijuana" (Luthar & Goldstein, 2008). Alpha coefficients among females and males respectively were 0.89 and 0.87, among NESSY-O, and 0.85 for both genders among NESSY-Y.

Parent monitoring: 12th grade. Paralleling measures used by Fletcher, Steinberg, and Williams-Wheeler (2004), participants were asked about how much their parents know about their activities via a five-item, 5-point scale (Luthar & Goldstein, 2008). Illustrative items include "My parents know where I am after school," "My parents know how I spend my money," and "My parents know who my friends are." Alpha coefficients among females and males respectively were 0.75 and 0.78 among NESSY-O, and 0.75 and 0.78 among NESSY-Y.

Results

Comparability of the two cohorts in adolescence

As noted earlier, the two cohorts were similar in sociodemographics; to ascertain overall comparability on substance use, we examined past-year rates of use as high school seniors versus rates in MTF norms also assessed in the 12th grade and during the same calendar year (i.e., 2005 and 2010 to compare with NESSY-O and NESSY-Y, respectively). Results for both cohorts are shown in Table 2. Note that in this and subsequent tables (Tables 3 and 4), comparisons in which the category encompasses more than one particular substance within MTF norms, the MTF value that we report is that of the substance with the highest rate in the norms. Thus, in the interest of stringency, we compare to MTF rates of Adderall rather than Ritalin that are lower in MTF; tranquilizers rather than barbiturates; and ecstasy rather than ketamine.

To ease interpretation of the array of values, we present not only rates in our two cohorts and those in MTF norms during the same calendar year but also the relative risk, calculated as a simple ratio. Thus, as 84.5% of NESSY-Y girls reported alcohol use in Grade 12 versus 65.3% in MTF norms, the relative ratio was 84.5/65.3 = 1.29 (the first row in Table 2). In addition, we conducted, significance testing to compare the proportions of use in the NESSY samples versus the MTF sample using two-tailed z tests, appropriately weighted for sample size differences. Where NESSY values were significantly higher than those in MTF, ratios and z scores are shown in bold in the tables.

As shown in Table 2, elevations were apparent on the use dimensions we had expected, a priori, based on prior high school assessments. For females and males in the older and younger cohorts, NESSY values were significantly higher than those in MTF on 11 of the 12 comparisons: frequency of alcohol use, drunkenness, and marijuana use among all subgroups with the exception of marijuana use among NESSY-O males. In addition, there were slight elevations in the use of tranquilizers only among NESSY-Y males and NESSY-O females, with the latter also showing elevations in Adderall use. Other rates of use were below norms in both high school cohorts.

Substance use relative to national norms

In Table 3, we present prevalence rates of substance use across each of the 4 college years for the NESSY-Y cohort, as compared to MTF normative rates (Johnston et al., 2014) corresponding to ages 19–22 years during the same calendar year. For comparisons in Table 3, again, two-tailed z tests weighted for sample size were conducted to test for differences in the proportions between the NESSY and MTF samples.

Unfortunately, MTF prevalence rates for college students specifically are not available separately by both age and gender, but rather are reported for the overall age bracket 19–22 years, encompassing typical ages during college attendance, separately for males and females. Because (a) it is well known that substance use is higher among college students than others (Substance Abuse and Mental Health Services Administration, 2012), and (b) of central interest to us, a priori, were gender-specific use patterns among NESSY youth across young adulthood, we used these MTF rates in central analyses of relative risk among NESSY-Y. (Note that comparisons by specific ages 19, 20, 21, and 22, relative to overall MTF rates for these ages, not just for college students and not separated by gender, are depicted in Figure 1.)

As shown in Table 3, for the four use indices in which we expected to see elevations (i.e., drunk, marijuana, stimulants, and cocaine), and across all 4 years of college and among both males and females, prevalence rates were significantly higher than norms in 27 of the 32 instances. Of the other 5 ratios that were not statistically significant, 4 were those for cocaine, which were 1.5–2.4 times higher in NESSY than MTF, but actual incidence rates were too low to allow for statistical significance (*n*s of 3, 5, 6, and 8 for values in order, across Table 3). The 27 significantly elevated ratios ranged from 1.27 to 5.33, with a median value of 1.81. Overall, therefore, findings were striking in showing that across all 8 observations (4 years and both genders), almost every ratio for drunk, marijuana, stimulants, and cocaine was above norms (97%), and relative elevations were statistically significant in 85% of comparisons.

In Table 4, we present parallel values for NESSY-O for five assessments between the ages of 23 in 2010, and 27 in 2014, compared with MTF normative rates for adults (ages 19–30, during the same calendar years), separately by males

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

Table 2. *Comparability of NESSY younger and older cohorts: Rates of past year use in Grade 12 split by gender, with ratios to MTF norms in the same chronological year*

	Females in 2010				Males in 2010				Females in 2005				Males in 2005			
	N-Y ($n = 123$)	MTF ($n = 7{,}100$)			N-Y ($n = 146$)	MTF ($n = 6{,}700$)			N-O ($n = 121$)	MTF ($n = 7{,}300$)			N-O ($n = 131$)	MTF ($n = 6{,}800$)		
	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z
Alcohol	84.5	65.3	**1.29**	**4.40****	80.2	65.0	**1.23**	**3.80****	83.3	67.5	**1.23**	**3.69*****	80.9	69.7	**1.16**	**2.77****
Drunk	71.5	40.8	**1.75**	**6.9****	69.8	46.8	**1.49**	**5.51****	71.1	44.0	**1.61**	**5.95****	66.4	51.4	**1.29**	**3.40*****
Marijuana	39.0	30.7	**1.27**	**1.99***	58.2	38.3	**1.52**	**4.88****	53.6	29.6	**1.81**	**5.71****	44.6	37.6	1.19	1.64
Cigarettes	21.8	—	—	—	27.5	—	—	**—**	48.8	—	—	—	43.1	—	—	—
Adderall[a]	7.4	5.5	0.60	0.91	7.7	7.5	1.02	0.09	9.9	3.3	**3.00**	**3.97****	6.9	5.4	1.28	0.75
Cocaine	0.8	1.9	0.42	−0.09	0.7	4.0	**0.17**	**−2.03***	5.9	4.2	1.40	0.92	3.1	5.8	0.53	−1.31
Tranquilizers[a]	1.6	5.2	0.31	−1.79	9.7	5.9	**1.64**	**1.92***	10.7	6.2	**1.73**	**2.02***	7.0	7.2	0.97	−0.09
Inhalants	0.8	2.5	0.32	−1.20	1.4	4.7	0.29	−1.88	2.5	4.1	0.61	−0.88	5.4	6.2	0.87	−0.38
Hallucinogen	0.0	2.9	0.00	−1.92	8.2	7.9	1.04	0.13	1.6	3.4	0.47	−1.09	4.6	7.4	0.62	−1.22
Ecstasy[a]	0.8	3.6	0.23	−0.17	2.1	5.3	0.39	−1.72	3.3	2.7	1.22	0.40	1.6	3.3	0.48	−1.08
Amphetamines	0.0	6.4	0.00	−1.88	2.8	8.3	**0.34**	**−2.40***	7.5	7.9	0.19	−0.16	1.5	9.1	**0.82**	**−3.02****
Steroids	0.0	0.3	0.00	−0.61	1.4	2.5	0.56	−0.85	0.0	0.4	0.00	−0.70	0.0	2.6	0.00	−1.87

Note: NESSY, New England Study of Suburban Youth; MTF, Monitoring the Future; N-Y, younger NESSY cohort; N-O, older NESSY cohort. The first three rows contain values for substances on which NESSY adult elevations were expected a priori. MTF norms are according to Johnston et al. (2012). Bold values indicate ratios where NESSY rates are significantly higher than MTF. Comparisons of population proportions using z scores were weighted for sample size.

[a]Comparisons for which MTF features multiple substances; ratios are based on the MTF substance with the highest rate, that is, Adderall > Ritalin. Ratio = %NESSY/%MTF.

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

Table 3. *NESSY younger cohort: Past-year substance use, with ratios of rates to MTF norms for college 19- to 20-year-olds, by gender*

	Females in 2011				Males in 2011				Females in 2012				Males in 2012			
	N-Y at Age 19 ($n = 77$)	MTF at Ages 19–22 ($n = 750$)			N-Y at Age 19 ($n = 58$)	MTF at Ages 19–22 ($n = 480$)			N-Y at Age 20 ($n = 78$	MTF at Ages 19–22 ($n = 670$)			N-Y at Age 20 ($n = 72$)	MTF at Ages 19–22 ($n = 480$)		
	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z
Drunk	83.9	58.1	**1.44**	**4.40****	80.9	63.4	**1.28**	**2.64****	93.6	62.5	**1.50**	**5.48****	76.3	59.9	**1.27**	**2.67****
Marijuana	53.3	29.0	**1.84**	**4.38****	56.8	39.9	**1.42**	**2.46***	61.1	32	**1.91**	**5.10****	58.4	39.0	**1.50**	**3.11****
Adderall[a]	16.9	7.7	**2.19**	**2.75****	27.5	13.2	**2.08**	**2.90****	16.9	7.6	**2.22**	**2.78****	30.6	11.1	**2.76**	**4.5****
Cocaine	3.9	2.6	1.50	0.67	12.1	4.5	**2.69**	**2.44***	6.4	2.7	2.37	1.79	18.1	3.7	**4.89**	**4.96****
Ecstasy[a]	2.6	3.8	0.68	−0.53	5.1	4.7	1.09	0.14	5.1	5.6	0.91	−0.18	18.0	6.0	**3.00**	**3.59****
Tranquil[a]	2.6	3.8	0.68	−0.53	8.5	4.9	1.73	1.16	3.9	3.1	1.26	0.38	9.8	3.9	**2.51**	**2.21***
Inhalants	1.4	0.7	2.00	0.67	5.1	1.1	**4.64**	**2.34***	1.3	1	1.3	0.25	0	2.3	0.00	−1.30
Heroin	0.0	0.1	0.00	−0.28	1.7	0.1	**17.00**	**2.21***	0.0	0.1	0.00	−0.28	1.4	0.2	7.00	1.59
Hallucinogens	2.6	1.9	1.37	0.42	3.5	7.5	0.47	−1.12	1.3	3.5	0.37	−1.03	7.0	6.0	1.17	0.33
Amphetamines	0.0	8.2	0.00	−2.61	1.7	11.1	**0.15**	**−2.25***	2.6	10.1	**0.26**	**−2.16***	5.6	12.6	0.44	−1.72
Alcohol	93.5	78.1	**1.20**	**3.19*****	91.2	76.2	**1.20**	**2.60****	94.9	80.3	**1.18**	**3.16****	87.6	77.5	**1.13**	**1.96***
Cigarettes	19.7	23.4	0.84	−0.73	39.6	29.5	1.34	1.58	25.7	21.3	1.21	0.89	35.7	26.3	1.36	1.66
Steroids	0.0	—	0.00	—	1.7	0.7	2.43	0.80	1.3	0.5	2.60	0.88	1.4	—	—	—

	Females in 2013				Males in 2013				Females in 2014				Males in 2014			
	N-Y at Age 21 ($n = 84$)	MTF at Ages 19–22 ($n = 660$)			N-Y at Age 21 ($n = 76$)	MTF at Ages 19–22 ($n = 430$)			N-Y at Age 22 ($n = 78$)	MTF at Ages 19–22 ($n = 590$)			N-Y at Age 22 ($n = 73$)	MTF at Ages 19–22 ($n = 440$)		
	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z
Drunk	91.5	56.4	**1.62**	**6.19****	78.9	60.3	**1.31**	**3.10****	87.1	61.2	**1.42**	**4.48****	78.0	59.4	**1.31**	**3.03****
Marijuana	58.4	32.6	**1.79**	**4.65****	54.1	40.1	**1.35**	**2.28***	32.1	32.3	0.99	−0.04	51.4	37.3	**1.38**	**2.28***
Adderall[a]	21.6	8.9	**2.43**	**3.60*****	28.4	13.3	**2.14**	**3.35*****	19.2	8.6	**2.23**	**2.95****	24.6	11.1	**2.22**	**3.17****
Cocaine	9.6	1.8	**5.33**	**4.17****	13.1	4.2	**3.12**	**3.13****	7.8	3.6	2.17	1.76	10.9	5.6	1.95	1.72
Ecstasy[a]	10.8	3.9	**2.77**	**2.82****	18.4	7.5	**2.45**	**3.04****	5.2	4.3	1.21	0.36	5.6	5.9	0.95	−0.10
Tranquilizers[a]	6.0	3.6	1.67	1.07	11.7	5.8	2.02	1.90	3.9	3.1	1.26	0.37	16.3	4.1	**3.98**	**4.12****
Inhalants	1.2	0.5	2.40	0.80	2.6	0.5	5.20	1.89	0.0	1.2	0.00	−0.97	2.8	1.4	2.00	0.88
Heroin	0.0	0.1	0.00	−0.29	0.0	0.5	0.00	−0.62	1.3	—	—	—	4.2	0.1	**42.00**	**3.94****
Hallucinogens	1.2	2.7	0.44	−0.82	6.6	7.3	0.90	−0.22	0.0	2.5	0.00	−1.41	5.6	6.1	0.92	−0.17
Amphetamines	2.4	9.4	**0.26**	**−2.15***	6.5	12.4	0.52	−1.49	1.3	8.8	**0.15**	**−2.30***	5.4	12.0	0.45	−1.66
Alcohol	98.7	74.2	**1.33**	**5.02****	84.1	77.7	1.08	1.26	92.3	76.2	**1.21**	**3.23****	89.0	75.9	**1.17**	**2.49***
Cigarettes	23.9	20.7	1.15	0.68	40.7	27.1	**1.50**	**2.40***	15.4	21.3	0.72	−1.21	32.9	24.5	1.34	1.52
Steroids	0.0	—	—	—	0.0	1.8	0.00	−1.18	0.0	0.2	0.00	−0.40	2.8	1.0	2.80	1.28

Note: NESSY, New England Study of Suburban Youth; MTF, Monitoring the Future; N-Y, younger NESSY cohort. The first four rows in the top and bottom sections contain values for substances on which NESSY adult elevations were expected a priori. MTF norms are according to Johnston et al. (2012). Bold values indicate ratios where NESSY rates are significantly higher than MTF. Comparisons of population proportions using z scores were weighted for sample size.

[a]Comparisons for which MTF features multiple substances; ratios are based on the MTF substance with the highest rate, that is, Adderall > Ritalin. Ratio = %NESSY/%MTF.

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

Table 4. *NESSY older cohort: Past-year substance use, with ratios of rates to MTF norms for college 19- to 30-year-olds, by gender*

	Females in 2010				Males in 2010				Females in 2011				Males in 2011			
	N-O at Age 23 ($n = 73$)	MTF at Ages 19–30 ($n = 3,400$)			N-O at Age 23 ($n = 74$)	MTF at Ages 19–30 ($n = 2,400$)			N-O at Age 24 ($n = 79$)	MTF at Ages 19–30 ($n = 3,300$)			N-O at Age 24 ($n = 81$)	MTF at Ages 19–30 ($n = 2,200$)		
	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z
Drunk	90.4	62.4	**1.45**	**4.90******	86.6	66.4	**1.30**	**3.64*****	81.5	59.9	**1.36**	**3.88******	87.7	69.2	**1.27**	**3.56*****
Marijuana	52.1	23.4	**2.23**	**5.68******	64.9	33.7	**1.92**	**5.56******	38.5	26.3	**1.46**	**2.43***	66.6	34.1	**1.95**	**6.01******
Adderall[a]	23.3	5.4	**4.31**	**6.49******	29.9	7.9	**3.78**	**6.66******	12.6	5.2	**2.42**	**2.88****	16.0	7.0	**2.28**	**3.05****
Cocaine	15.1	3.5	**4.31**	**5.17******	19.0	6.3	**3.01**	**4.31******	10.2	3.3	**3.27**	**3.32*****	16.0	6.4	**2.50**	**3.38*****
Ecstasy[a]	9.6	2.6	**3.69**	**3.62*****	13.5	3.9	**3.46**	**4.06******	7.6	3.1	**2.45**	**2.24***	9.8	3.8	**2.57**	**2.70****
Tranquilizers[a]	8.2	6.1	1.34	0.74	13.6	6.6	**2.06**	**2.35***	5.1	5.4	0.94	−0.12	11.3	6.3	1.79	1.80
Inhalants	1.4	0.7	2.00	0.70	0.0	1.9	0.00	−1.20	1.3	0.6	**2.17**	0.79	0.0	1.1	0.00	−0.95
Heroin	0.0	0.3	0.00	−0.47	1.4	0.6	2.33	0.86	0.0	0.3	0.00	−0.49	1.2	0.7	**1.71**	0.52
Hallucinogens	6.9	2.7	**2.55**	**2.16***	12.2	5.6	**2.18**	**2.39***	5.1	2.2	2.32	1.71	14.8	5.3	**2.79**	**3.64*****
Amphetamines	8.3	5.6	1.48	0.99	6.8	7.7	0.88	−0.29	3.9	5.8	0.67	−0.72	2.6	7.7	0.34	−1.71
Alcohol	97.2	83.0	**1.17**	**3.22****	96.0	83.8	**1.15**	**2.83****	96.1	83.1	**1.16**	**3.07****	96.3	84.7	**1.14**	**2.88****
Cigarettes	47.8	29.5	**1.62**	**3.38*****	54.2	37.0	**1.46**	**3.01****	39.2	27.8	**1.41**	**2.23***	48.2	35.9	**1.34**	**2.26***
Steroids	0.0	0.1	0.00	−0.27	0.0	1.6	0.00	−1.10	0.0	0.1	0.00	−0.28	0.0	0.3	0.00	−0.49

	Females in 2012				Males in 2012				Females in 2013				Males in 2013			
	N-O at Age 25 ($n = 79$)	MTF at Ages 19–30 ($n = 3,200$)			N-O at Age 25 ($n = 89$)	MTF at Ages 19–30 ($n = 2,200$)			N-O at Age 26 ($n = 82$)	MTF at Ages 19–30 ($n = 3,100$)			N-O at Age 26 ($n = 93$)	MTF at Ages 19–30 ($n = 2,100$)		
	%		Ratio	z	%		Ratio	z	%		Ratio	z	%		Ratio	z
Drunk	83.6	63.6	**1.31**	**3.66*****	88.6	66.2	**1.34**	**4.41******	85.4	59.7	**1.43**	**4.70******	91.4	67.4	**1.36**	**4.87******
Marijuana	31.4	25.2	1.25	1.25	61.8	33.5	**1.84**	**5.50******	39.1	28.0	**1.40**	**2.20***	64.6	34.5	**1.87**	**5.93******
Adderall[a]	14.8	5.8	**2.55**	**3.32*****	13.3	8.2	1.62	1.70	22.1	5.3	**4.17**	**6.46******	15.2	7.9	**1.92**	**2.51***
Cocaine	8.6	3.0	**2.87**	**2.82****	19.0	5.3	**3.58**	**5.41******	14.7	2.8	**5.25**	**6.13******	19.5	5.3	**3.68**	**5.69******
Ecstasy[a]	7.4	3.1	**2.39**	**2.14***	9.0	4.8	1.87	1.79	10.9	3.2	**3.40**	**3.80*****	17.3	4.8	**3.60**	**5.25******
Tranquilizers[a]	6.1	4.9	1.24	0.49	9.1	5.4	1.68	1.50	9.6	5.2	1.85	1.75	11.9	5.7	**2.09**	**2.47****
Inhalants	0.0	0.7	0.00	−0.75	2.2	1.5	1.47	0.53	4.8	0.3	**16.00**	**6.25******	1.1	0.7	1.57	0.45
Heroin	0.0	0.4	0.00	−0.56	0.0	0.5	0.00	−0.67	0.0	0.5	0.00	−0.64	0.0	0.8	0.00	−0.87

Table 4 (*cont.*)

	Females in 2012				Males in 2012				Females in 2013				Males in 2013			
	N-O at Age 25 ($n = 79$)	MTF at Ages 19–30 ($n = 3,200$)			N-O at Age 25 ($n = 89$)	MTF at Ages 19–30 ($n = 2,200$)			N-O at Age 26 ($n = 82$)	MTF at Ages 19–30 ($n = 3,100$)			N-O at Age 26 ($n = 93$)	MTF at Ages 19–30 ($n = 2,100$)		
	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z	%	%	Ratio	z
Hallucinogens	4.9	2.7	1.81	1.18	9.0	4.4	**2.04**	**2.04***	4.8	2.2	2.18	1.56	14.0	6.0	**2.33**	**3.10****
Amphetamines	3.7	6.3	0.59	−0.94	2.2	8.6	**0.26**	**−2.14***	6.0	6.5	0.92	−0.18	4.4	8.3	0.53	−1.35
Alcohol	96.4	83.4	**1.16**	**3.09****	94.4	81.8	**1.15**	**3.05****	97.5	82.5	**1.18**	**3.56*****	99.0	84.0	**1.18**	**3.93******
Cigarettes	39.5	26.5	**1.49**	**2.58***	47.2	33.4	**1.41**	**2.70****	45.1	26.8	**1.68**	**3.67*****	49.4	32.3	**1.53**	**3.43*****
Steroids	0.0	0.1	0.00	−0.28	0.0	0.9	0.00	−0.90	0.0	0.1	0.00	−0.29	0.0	0.9	0.00	−0.92

	Females in 2014				Males in 2014			
	N-O at Age 27 ($n = 82$)	MTF at Ages 19–30 ($n = 3,000$)			N-O at Age 27 ($n = 89$)	MTF at Ages 19–30 ($n = 2,000$)		
	%	%	Ratio	z	%	%	Ratio	z
Drunk	89.0	61.8	**1.44**	**5.02******	83.1	66.3	**1.25**	**3.30****
Marijuana	36.3	27.8	1.31	1.69	55.8	34.2	**1.63**	**4.18******
Adderall[a]	22.0	6.5	**3.38**	**5.46******	11.2	8.8	1.27	0.78
Cocaine	10.9	3.6	**3.03**	**3.41*****	18.9	6.9	**2.74**	**4.23******
Ecstasy[a]	9.9	3.4	**2.91**	**3.13****	12.4	5.4	**2.30**	**2.79****
Tranquilizers[a]	13.4	5.0	**2.68**	**3.37*****	7.8	4.8	1.63	1.28
Inhalants	2.6	0.9	2.89	1.57	0.0	1.1	0.00	−0.99
Heroin	0.0	0.3	0.00	−0.50	0.0	0.4	0.00	−0.60
Hallucinogens	2.5	2.4	1.04	0.06	11.1	5.9	**1.88**	**2.00***
Amphetamines	6.0	6.8	0.88	−0.28	1.1	8.8	**0.13**	**−2.55***
Alcohol	97.6	82.9	**1.18**	**3.52*****	89.9	83.1	1.08	1.69
Cigarettes	43.9	24.1	**1.82**	**4.11******	39.4	31.1	1.27	1.65
Steroids	0.0	0.3	0.00	−0.50	0.0	1.1	0.00	−3.31***

Note: NESSY, New England Study of Suburban Youth; MTF, Monitoring the Future; N-Y, younger NESSY cohort. The first four rows in each section contain values for substances on which NESSY adult elevations were expected a priori. MTF norms are according to Johnston et al. (2012). Bold values indicate ratios where NESSY rates are significantly higher than MTF. Comparisons of population proportions using z scores were weighted for sample size.

[a]Comparisons for which MTF features multiple substances; ratios are based on the MTF substance with the highest rate, that is, Adderall > Ritalin. Ratio = %NESSY/%MTF.

*$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

and females. Unfortunately, MTF normative rates for adult men and women are not broken down by specific age but are presented across the span of 19–30 years. Again, as our central a priori goal was to illuminate NESSY use patterns separately by gender, our primary analyses entailed comparisons of adult MTF men and women in Table 4. Subsequently, we also show descriptive rates for specific NESSY ages 23, 24, 25, 26, and 27, relative to each of these ages in MTF (not split by gender) in Figure 1.

As in preceding analyses, two-tailed z tests weighted for sample size were conducted to test for differences in the proportions between the NESSY and MTF samples. Rates were significantly different in 36 of the 40 comparisons involving elevations hypothesized a priori: drunkenness, marijuana, stimulants, and cocaine, among females and males across five observations. The four nonsignificant ratios were all above 1, for example, 1.25 for marijuana use by females at 25, 1.62 for Adderall use by males at age 25, 1.31 for marijuana use by females age 27, and 1.27 for Adderall use by males age 27. The 36 significantly elevated ratios ranged from 1.25 to 5.25, with a median value of 2.1.

Aside from the indices we had hypothesized to be elevated, findings also revealed distinct elevations on club drugs such as ecstasy among NESSY-O, with 9 of the 10 values statistically significant ranging from 2.30 to 3.69 (Table 4). Tranquilizer use rates were somewhat higher than norms in both cohorts, with 12 of the 18 ratios across Tables 3 and 4 being greater than 1.5 (although only statistically significant differences in 5 of these, possibly due in part to low incidence of tranquilizer use overall). Finally, cigarette use, surprisingly, was significantly elevated in 9 of the 10 comparisons among NESSY-O, with z scores ranging from 1.34 to 1.82.

Trends displayed over time

Figure 1 displays patterns of use over time for both cohorts, side by side, across the four annual assessments during college (NESSY-Y) and five adult assessments (NESSY-O), along with national norms by individual age. As noted before, previously discussed comparisons in Table 3 referenced national rates for 19- to 22-year-old college students, rather than separate rates for 19-, 20-, 21-, and 22-year-olds. In Figure 1, we present comparisons of NESSY-Y with MTF rates for each age (19, 20, 21, and 22 years), acknowledging that the latter normative data included both college students and others, and combined for men and women. As a reference point for patterns during each of the adult years, we include Grade 12 rates. In these figures, NESSY-Y and NESSY-O rates are shown by the lines across the annual assessments, and the bars show parallel rates for the MTF normative samples at the same age and during the same calendar year. These comparative rates are shown not only for the four indices for which we had expected elevations a priori (drunk, marijuana, stimulants, and cocaine) but also for ecstasy and downers (e.g., tranquilizers) that we found, in this study, to show elevations (Table 3 and Table 4).

With regard to possible "maturing out," across the college years, prevalence rates did seem to decrease for some indices by the senior year of college, for example, marijuana and ecstasy. At the same time, elevations relative to norms appeared somewhat elevated among NESSY-Y on drunk (83% vs. 66% in norms), stimulant use (21% vs. 8% in norms), and cocaine use (9% vs. 5%; percentages averaged across men and women, in Table 3). Among NESSY-O individuals, we did not see any marked reductions in rates of use at the last assessment relative to all prior years, ages 23 to 27 years.

Diagnoses

Presented in Table 5 are lifetime rates of DSM-IV substance use diagnoses in the NESSY-Y (age 22 years) and NESSY–O (age 26 years) cohorts, compared with rates of diagnoses estimated in the NCS-R study for adults of the same age (Kessler et al., 2004), separately by gender. Values in the first set of columns are based on lifetime diagnoses as reported in only the last assessment of NESSY-Y or NESSY-O along with parallel values in the NCS-R (also based on a single assessment), and their ratio, NESSY/NCS-R. Again, two-tailed z tests weighted for sample size were conducted to test for differences in the proportions between the NESSY and MTF samples. Incidence rates in the last set of columns for women and men represent diagnoses based on cumulative assessments, that is, if criteria were met at any of the annual assessments conducted, for each cohort.

The first two rows of Table 5 depict the diagnostic values of greatest concern (i.e., signifying dependence on, or addiction, to any substance). As shown there, values were significantly elevated for three of the four subgroups with relative ratios of 2.37, 3.30, and 2.05 for NESSY-Y men and NESSY-O women and men, respectively. Among NESSY-Y women, rates of dependence were close to those in national norms.

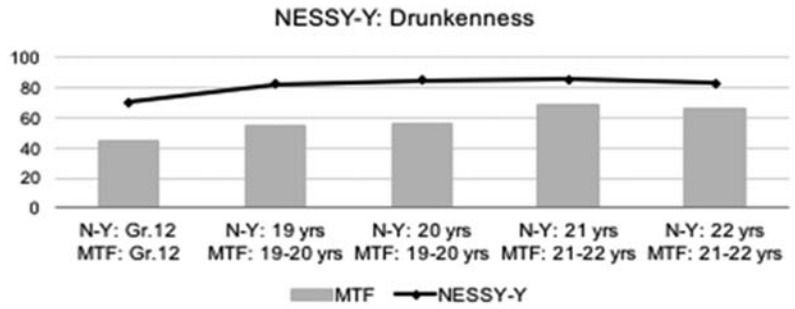
Percentages of participants meeting diagnostic criteria for dependence based on cumulative assessments in the last column, versus a single assessment (first column) were 15.8% versus 11.4% for NESSY-Y women; 26.9% versus 19.2% for NESSY-Y men; 24.2% versus 18.5% for NESSY-O women; and were substantially different among NESSY-O men, at 40.0% versus 22.6%.

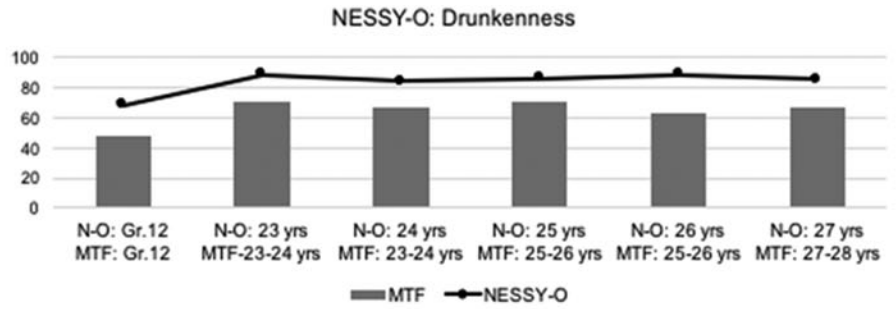
On diagnoses of any substance abuse, NESSY-Y men and women were both below norms. Their older counterparts were above norms (ratios 1.4 and 1.33), but these differences were not statistically significant.

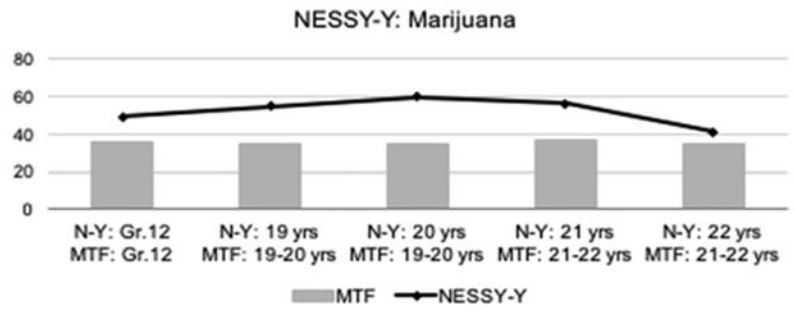
Predicting substance use in adulthood

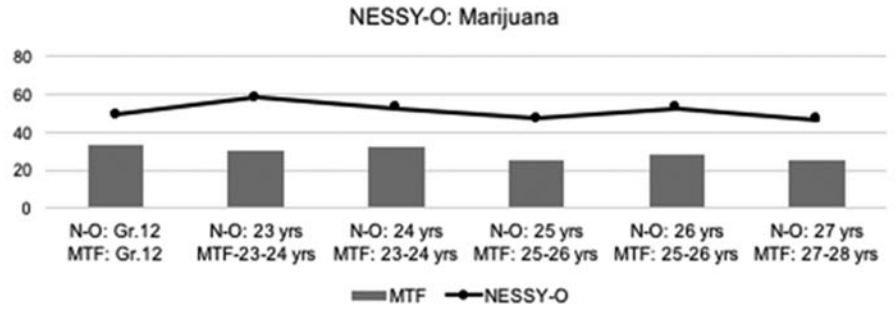
For the prospective examination of associations between high school containment and adult use levels, regression and mediation analyses were conducted using MPlus 7.11 (Muthén & Muthén, 2013) with full information maximum likelihood unless otherwise specified. Maximum likelihood missing data handling was employed to account for the existence of missing data (Enders, 2010), whether due to attrition or a result of incomplete measurement. Maximum likelihood miss-

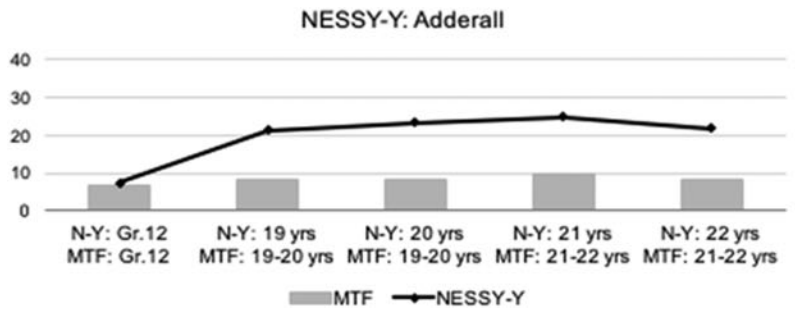
https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

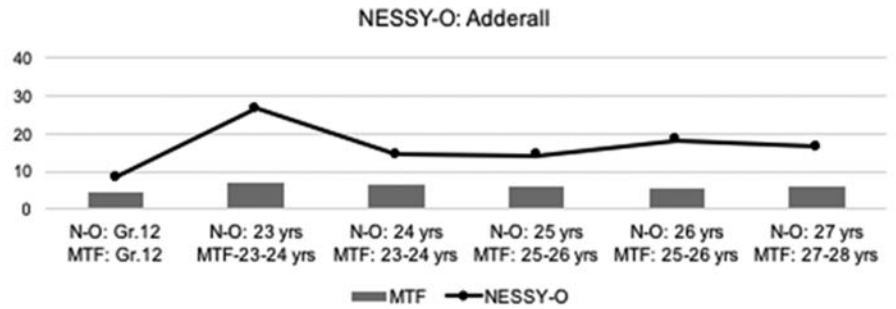












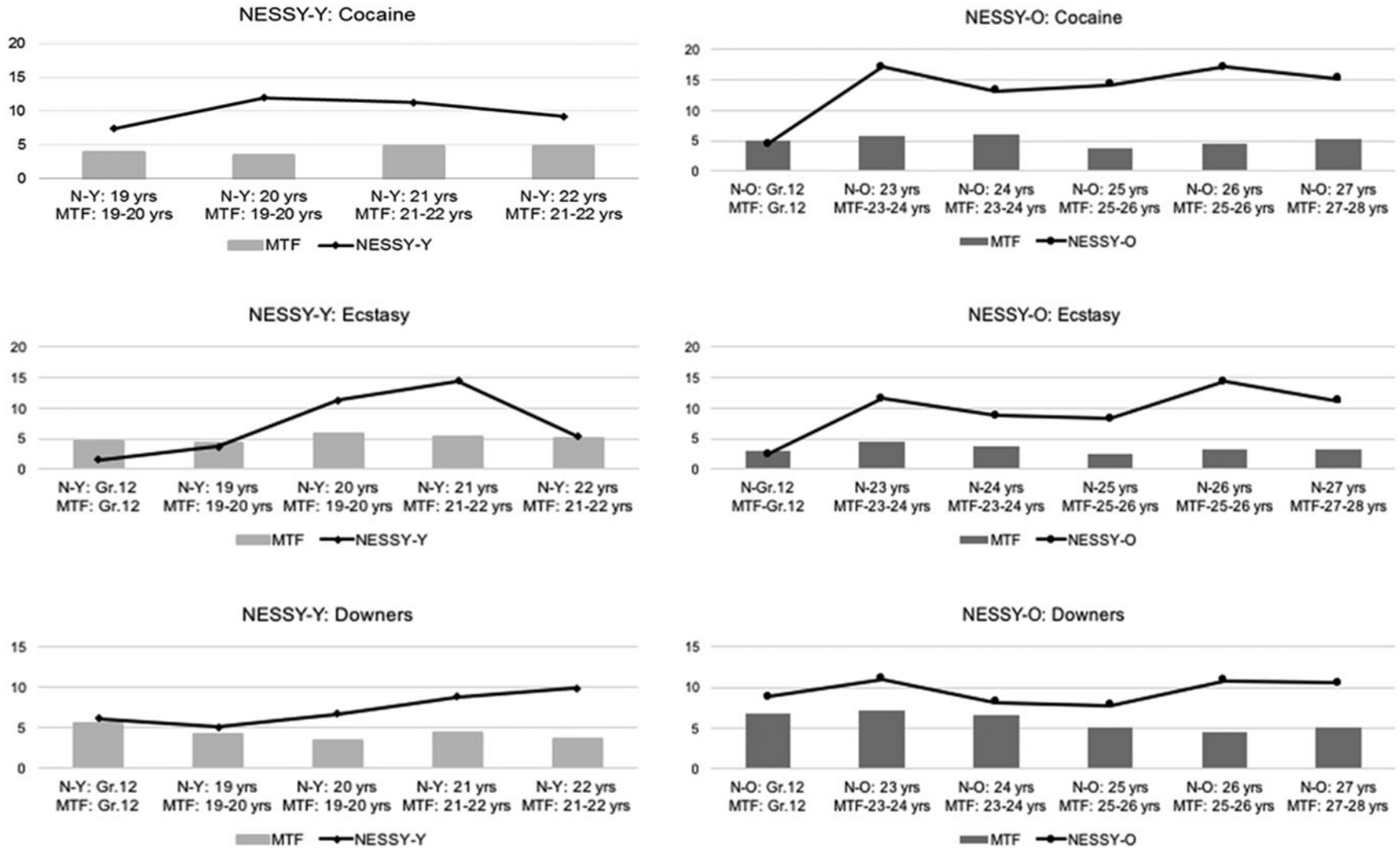


Figure 1. Rates of use at specific ages for New England Study of Suburban Youth younger (NESSY-Y) and older (NESSY-O) cohorts compared to Monitoring the Future (Johnston et al., 2012) norms during the same calendar years for drunkenness, and use of marijuana, Adderall, cocaine, ecstasy, and downers. Data for NESSY-Y and NESSY-O are represented by the lines, and Monitoring the Future norms are represented by the columns.

Table 5. *Lifetime DSM-IV substance use diagnoses in the NESSY-Y (age 22 years) and NESSY-O (age 26 years) cohorts versus NCS-R for participants aged 22 years and 26 years*

		Women					Men				
		NESSY[a] % (*n*)	NCS-R[a] % (*n*)	Ratio	*z*	NESSY[b] % (*n*)	NESSY[a] % (*n*)	NCS-R % (*n*)	Ratio	*z*	NESSY[b] % (*n*)
Any substance dependence	NESSY-Y	11.4 (9)	12.0 (9)	0.95	−0.12	15.8 (15)	19.2 (14)	8.1 (5)	**2.37**	**2.04***	26.9 (25)
	NESSY-O	18.5 (15)	5.6 (5)	**3.30**	**2.68****	24.2 (23)	22.6 (21)	11.0 (9)	**2.05**	**1.94***	40.0 (44)
Any substance abuse	NESSY-Y	10.1 (8)	21.0 (17)	**0.48**	**−1.94***	15.8 (15)	17.8 (13)	23.7 (14)	0.75	−0.91	30.1 (28)
	NESSY-O	22.2 (18)	15.9 (13)	1.40	1.07	30.5 (29)	26.9 (25)	20.2 (14)	1.33	0.99	51.8 (57)
Alcohol dependence	NESSY-Y	8.9 (7)	9.9 (8)	0.89	−0.22	12.6 (12)	13.7 (10)	8.1 (5)	1.69	1.13	19.4 (18)
	NESSY-O	14.8 (12)	4.1 (4)	**3.60**	**2.48****	22.1 (21)	17.4 (16)	10.9 (9)	1.60	1.16	31.8 (35)
Alcohol abuse	NESSY-Y	7.6 (6)	18.2 (15)	**0.41**	**−2.04****	12.6 (12)	15.1 (11)	20.5 (12)	0.74	−0.88	25.8 (24)
	NESSY-O	18.5 (15)	12.7 (11)	1.46	1.07	27.4 (26)	20.4 (19)	20.2 (14)	1.01	0.03	46.4 (51)
Drug dependence	NESSY-Y	2.5 (2)	5.7 (4)	0.44	−1.01	4.2 (4)	9.7 (7)	1.8 (1)	**5.39**	**2.17***	16.1 (15)
	NESSY-O	7.4 (7)	2.3 (2)	**3.22**	**1.61***	8.4 (8)	8.6 (8)	4.8 (4)	1.79	0.94	19.1 (21)
Drug abuse	NESSY-Y	3.8 (3)	11.2 (10)	**0.34**	**−1.80***	6.3 (6)	9.7 (7)	10.3 (7)	0.94	−0.12	21.5 (20)
	NESSY-O	11.1 (9)	12.9 (10)	0.86	−0.38	12.6 (12)	11.8 (11)	18.5 (12)	0.64	−1.19	26.4 (29)

Note: NESSY-Y, New England Study of Suburban Youth younger cohort; NESSY-O, NESSY older cohort; NCS-R, National Comorbidity Survey Replication. Sampling weights were used to calculate percentages for NCS-R data according to Kessler et al. (2004). NCS-R age 22 women: $n = 95$, men: $n = 84$; NCS-R age 26 women: $n = 96$, men: $n = 71$. Comparisons of population proportions using z scores were weighted for sample size.

[a]NESSY rates based on final assessment point only: ages 22 and 27 for NESSY-Y and NESSY-O, respectively. Ratio = %NESSY/%MTF. NESSY-Y: $n = 78$ women, $n = 73$ men; NESSY-O: $n = 82$ women, $n = 89$ men.

[b]NESSY rates based on all annual assessments. Cumulative NESSY-O: $n = 95$ women, $n = 110$ men; cumulative NESSY-Y: $n = 95$ women, $n = 93$ men.

*$z \geq 1.6$, $p < .05$. **$z \geq 2.5$, $p < .01$.

ing data handling utilizes all of the available observations for each case to compute the likelihood function (Enders & Bandalos, 2001), and subsequently provides unbiased estimates with minimal standard errors when data are missing at random (Schafer & Graham, 2002). To account for the existence of missing data and ensure the use of all available observations, maximum likelihood missing data handling requires that the model specify the estimation of means, variances, and covariances among the predictors.

In examining long-term effects of perceived parents' containment, we examined whether containment in high school was linked with use frequencies at the last assessment for three indices on which we expected adequate variability: drunk, marijuana use, and stimulant use. Regression analyses showed that after controlling for gender and parental monitoring, containment was significantly associated with lower levels of drunkenness and marijuana use among NESSY-Y, and for all three outcomes among NESSY-O (see Table 6). Once Grade 12 levels of overall substance use (summed across all substances) were also considered in Model 2, three of the five associations became nonsignificant, suggestive of mediated effects. (Correlations between containment and Grade 12 use were $r = -.40$ for NESSY-Y and $r = -.46$ for NESSY-O, respectively; between containment and gender were $r = -.05$ for NESSY-Y and $r = -.02$ for NESSY-O, respectively; and between Grade 12 use and gender were $r = -.03$ for NESSY-Y and $r = -.19$ for NESSY-O, respectively.)

In follow-up analyses, we estimated mediated effects and 95% confidence intervals for the same three substance use indices for which we ran regressions, using MODEL INDIRECT in Mplus 7.1 (Muthén & Muthén, 2013) with bias corrected bootstrap resampling (5,000 samples) for greater accuracy in the estimation of the standard errors (MacKinnon, 2008). A mediated effect was considered statistically significant when the confidence interval did not contain zero (MacKinnon, 2008). The results indicated that Grade 12 use significantly mediated the influence of parental containment on drunkenness and marijuana use for both NESSY-O and NESSY-Y cohorts, and on stimulant use for the NESSY-Y cohort only (see Table 7).

Discussion

Our findings suggest that it is probably unwise to treat lightly the elevated rates of substance use previously documented among upper middle class teenagers; a troubling proportion of these youth met criteria for diagnoses of substance dependence in their late 20s. In the older NESSY cohort assessed at age 26, lifetime diagnoses of addiction to any substance (drug or alcohol) were over 2 and 3 times those of national rates, for men and women, respectively. Data on the younger NESSY cohort showed that by age 22 years, lifetime rates of dependence on any substance were 2.4 times national rates for men, although rates among the younger women were closer to normative rates (0.95).

It should be noted that the estimates discussed here are on the conservative side, being based on a single diagnostic interview (the last in the follow-ups of each cohort). Retrospective recall could have diminished reporting of some serious use in past years (Moffitt et al., 2010; Olino et al., 2012; Takayanagi et al., 2014). As shown in the tables, when overall lifetime rates were computed on the basis of repeated annual interviews, rates of diagnoses were substantially higher.

Further suggesting the seriousness of the issues are data on the actual frequency of using different substances over time, including not only drunkenness and marijuana use (elevated even in high school) but also the use of stimulants and cocaine as hypothesized. Across multiple waves, stimulant use rates for NESSY-O ranged between 15% and 20%, at least twice as high as in MTF norms. Among NESSY-Y across the college years, one in five of NESSY-Y on average reported misusing stimulants, rates more than twice as high as in normative MTF samples. Similar trends were seen on cocaine: in both cohorts, rates of cocaine use were, again, at least twice as high as in norms.

One of the four subgroups in this study did not show significant elevations in diagnoses of any substance dependence compared to NCS-R rates: that is, NESSY-Y women. However, even among these young women, a disturbingly high proportion were not only getting drunk frequently but also misusing other substances. Rates of intoxication were around 1.5 those of MTF norms across the four assessment waves as rates for both stimulants and cocaine were 1.5 to more than 2 times normative values. The consistency of elevated frequencies across time is cause for concern (notwithstanding that some frequent users did not meet criteria for addiction by age 22). It is also possible that increasing proportions of these young women would meet diagnostic criteria in the years after college graduation, approaching the clearly elevated rates of NESSY-O women by age 26.

Conservatively estimating, therefore, for three of the four subgroups in this study, findings resonate with reports on the growing problem of abuse in segments of the population that thus far have not been thought of as being "at risk." Recent studies have suggested that in their adult years, adolescents from high SES families have higher rates of binge drinking as well as misuse of marijuana, stimulants, prescription drugs, and cocaine, with these elevations seen even among those with full-time employment, well after college graduation (Arria, Bugbee, Caldeira, & Vincent, 2014; Humensky, 2010). These past reports have been based on survey data; to our knowledge, ours is the first study to report on interview-based DSM-IV diagnoses, with rates reported for both substance dependence and abuse. It is worrisome to learn that before their 27th birthdays, lifetime diagnoses of any substance dependence could be seen among men and women from upper middle class communities in as many as 23%–40% of men, and 19%–24% of women.

Potentially mitigating concerns, in contrast, it should be noted that with further developmental maturity, diagnoses of past-year dependence could be reduced somewhat.

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

Table 6. *Linear regression analyses of Grade 12 perceived parents' containment in relation to adult use frequencies*

	Drunk				Marijuana				Stimulants			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
Predictors	β	*b* (*SE*)	β	*b* (*SE*)	β	*b* (*SE*)	β	*b* (*SE*)	β	*b* (*SE*)	β	*b* (*SE*)
NESSY-Y College Senior (Age 22) Substance Use Frequencies												
Grade 12 substance use	—	—	0.41**	0.13 (0.03)	—	—	0.34**	0.10 (0.03)	—	—	0.36**	0.08 (0.02)
Gender	0.07	0.24 (0.32)	0.02	0.06 (0.30)	0.32**	1.17 (0.30)	0.28**	1.0 (0.29)	0.02	0.05 (0.24)	−0.03	−0.08 (0.23)
Containment	−0.23*	−0.09 (0.04)	−0.07	−0.03 (0.04)	−0.29**	−0.12 (0.04)	−0.17*	−0.07 (0.04)	−0.01	−0.00 (0.03)	0.13	0.04 (0.03)
Parent monitoring	0.04	0.02 (0.04)	0.10	0.04 (0.04)	0.03	0.01 (0.04)	0.07	0.03 (0.04)	−0.07	−0.02 (0.03)	−0.01	−0.00 (0.03)
Adjusted R^2	.03		.17**		.16**		.26**		−.02		.08*	
NESSY-O Age 26 Substance Use Frequencies												
Grade 12 substance use	—	—	0.28**	0.06 (0.02)	—	—	0.23*	0.06 (0.03)	—	—	0.09	0.02 (0.02)
Gender	0.02	0.09 (0.33)	0.03	0.11 (0.32)	0.20*	0.94 (0.39)	−0.20*	0.96 (0.39)	−0.14	−0.47 (0.28)	−0.14	−0.46 (0.28)
Containment	−0.23**	−0.10 (0.04)	−0.11	−0.05 (0.04)	−0.25**	−0.13 (0.04)	−0.16	−0.08 (0.05)	−0.32**	−0.12 (0.03)	−0.29**	−0.11 (0.03)
Parent monitoring	−0.08	−0.26 (0.27)	−0.03	−0.10 (0.26)	−0.05	−0.18 (0.31)	−0.01	−0.03 (0.31)	−0.04	−0.10 (0.22)	−0.02	−0.06 (0.22)
Adjusted R^2	.05*		.10**		.10**		.14**		.10**		.10**	

Note: Gender was coded 0 = female, 1 = male; Grade 12 substance use is the sum of the frequencies of using all substances; Model 1 does not control for Grade 12 substance use, whereas Model 2 does control for Grade 12 substance use. NESSY-Y and -O, New England Study of Suburban Youth younger cohort and older cohort.
*$p < .05$. **$p < .01$.

Table 7. *Grade 12 perceived parents' containment in relation to adult use frequencies with estimates of the mediating effects of Grade 12 substance use with bias-corrected 95% confidence limits*

Mediated Pathway	Point Estimate (*ab*)	*SE*	BC 95% CI Lower	BC 95% CI Upper
NESSY-Y				
Containment → Grade 12 substance use → drunk age 22	−0.08*	0.02	−0.13	−0.04
Containment → Grade 12 substance use → marijuana age 22	−0.07*	0.02	−0.13	−0.04
Containment → Grade 12 substance use → stimulants age 22	−0.05*	0.02	−0.09	−0.02
NESSY-O				
Containment → Grade 12 substance use → drunk age 26	−0.003*	0.001	−0.006	−0.001
Containment → Grade 12 substance use → marijuana age 26	−0.003*	0.001	−0.007	−0.001
Containment → Grade 12 substance use → stimulants age 26	−0.000	0.001	0.000	0.001

Direct Pathway	Estimate	*SE*	BC 95% CI Lower	BC 95% CI Upper
NESSY-Y				
Containment → Grade 12 substance use	−0.72**	0.10	−0.85	−0.45
Containment → drunk age 22	−0.04	0.04	−0.11	0.03
Grade 12 substance use → drunk age 22	0.11**	0.03	0.06	0.16
Containment → marijuana age 22	−0.09*	0.04	−0.16	−0.01
Grade 12 substance use → marijuana age 22	0.10*	0.03	0.04	0.16
Containment → stimulants age 22	0.05	0.03	−0.01	0.12
Grade 12 substance Use → stimulants age 22	0.07**	0.02	0.03	0.12
NESSY-O				
Containment → Grade 12 substance use	−0.04**	0.02	−0.07	−0.001
Containment → drunk age 26	−0.001	0.01	−0.02	0.02
Grade 12 substance use → drunk age 26	0.08**	0.02	0.04	0.11
Containment → marijuana age 26	−0.005	0.01	−0.02	0.02
Grade 12 substance use → marijuana age 26	0.08**	0.02	0.03	0.12
Containment → stimulants age 26	−0.004**	0.001	−0.005	−0.003
Grade 12 substance use → stimulants age 26	−0.002	0.003	−0.008	0.004

Note: Grade 12 substance use is the sum of the frequencies of using any substances. Covariates not shown include gender and parent monitoring. NESSY-Y and -O, New England Study of Suburban Youth younger cohort and older cohort.
*$p < .05$. **$p < .01$.

Whereas life transitions such as marriage or having children are typically associated with marked reductions in substance use (Bachman et al., 1997; Glatz et al., 2012), in the upper middle class cohorts in this study, neither event had yet occurred at their final assessments for any participant. In future work, it will be important to ascertain whether diagnostic rates, as well as frequency of use, decrease with transition to adult roles such as marriage (which tends to occur later among the more affluent), or whether they might remain elevated given high lifetime rates already documented.

Containment

Perceived parent containment for substance use is reportedly a robust predictor of concurrent use levels among affluent adolescents (Luthar et al., 2013), and results of this study indicate potential ramifications continuing well into adulthood (Hartman et al., 2016). Perceived parents' containment at age 18 was found to have direct associations with the frequency of marijuana use at age 22 among the younger NESSY cohort, and with the frequency of stimulant use at age 27 among the older cohort. Furthermore, containment was indirectly associated, through substance use in Grade 12, with drunkenness and marijuana use at both age 22 and age 27 years, and with stimulant use at age 22.

Along with prior evidence that perceived parental approval of substance use influences substance use behavior (Boyle & Boekeloo, 2006; Messler, Quevillon, & Simons, 2014), findings from this study highlight the need for upper middle class parents to revisit laissez-faire attitudes toward their high school children's substance use, with three caveats. The first is that the repercussions meted out should be consequential, but at the same time, (a) are not draconian, (b) are mutually agreed upon (for "repeat offenses"), and (c) are consistently enforced, within the context of a supportive parent–child relationship. Overly severe punishments in the absence of support and nurturance will inevitably backfire (Luthar et al., 2013). Second, along with such limit setting, parents would do well to discuss these issues long before the onset of high school, spelling out the risks associated. In this regard, Reyna and

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

Mills's (2014) findings are useful, showing the benefits of sex education programs conveying the "bottom line" of the risks involved, such as "it only takes once" to contract a sexually transmitted disease. With regard to substance abuse, an analogous message for these highly achieving and ambitious youth might be that "it takes only one arrest" for cocaine possession, or for injuring someone while driving intoxicated, to disqualify them from future careers involving high-profile, senior positions of substantive leadership.

Limitations

There are questions about generalizability of our findings, as both schools from which cohorts were originally sampled were located in the suburbs of the northeastern United States (although in their adult years, participants lived in varied geographic locations). At the same time, we should note that the 12th grade elevations in use are consistent with high relative risk rate patterns across many other high school samples, in suburbs and cites (see Botticello, 2009; Coley et al., 2017; Lund et al., 2017; Patrick et al., 2012; Reboussin et al., 2010; Song et al., 2009).

A related limitation is small sample size; neither cohort was large, and each showed the kind of attrition that is expected when high school students are followed into adulthood. As noted earlier, high school assessments were conducted as part of the routine school day, whereas all subsequent interviews required proactive participation. This said, our retention rates of 56% to 72% across adult assessments compare reasonably with parallel MTF rates for high school seniors, ranging from 50% to 54% for the first year through the fifth year after high school (Johnston et al., 2014), although for NESSY-Y, rates are lower than the approximately 65% retention in prospective studies that used interviews rather than survey-based questionnaires (see Deng, Hillygus, Reiter, Si, & Zeng, 2013; Rothman, 2009). Perhaps most importantly, there was no evidence of differential attrition in either the NESSY-O or the NESSY-Y cohort, in terms of high school levels of substance use, or on multiple sociodemographic indices including parents' education, employment status, race, or marital status.

With regard to findings on containment, the possibility of bidirectional effects must be acknowledged. There is a considerable literature showing that children's behaviors can affect those of parents in addition to the reverse (see Abar, Jackson, & Wood, 2014; Kerr, Stattin, & Özdemir, 2012; Pardini, 2008; Racz & McMahon, 2011). Thus, in some instances, it is plausible that adolescents were using frequently but without being caught, leading to beliefs that if use were to be detected, the teen might minimize it as a one-time event and thus meet with few consequences from parents.

As we fully acknowledge the limitations of this work, we believe that it is worth considering our findings, at the very least, as pointing to potentially serious public health issues warranting further rigorous study. A defining feature of the field of developmental psychopathology, across the more than three decades since its inception, is careful attentiveness to the implications of data for policy and practice (Cicchetti, 1984). As colleagues in science weigh the credibility of the rates we have described, to treat them as probable "false positives" (e.g., as they are based on just two Northeast cohorts) could turn out to be a disservice to many if there are serious problems of drug and alcohol addiction in a substantial proportion of youth growing up in affluent communities. Our own perspective is that from a prevention standpoint, it might be more prudent to treat these elevated rates of addiction as real possibilities, with future research systematically refuting or substantiating this postulate as the case may be, given the substantial costs of these problems to society: estimated at over $600 billion in the United States (National Institute on Drug Abuse, 2014). Even among well-educated adults, frequent use of alcohol and drugs is linked with lower yearly earnings as well as poorer functioning at work (Ellickson, Martino, & Collins, 2004; Ellickson, Tucker, Klein, & McGuigan, 2001; Griffin, Samuolis, & Williams, 2011).

Finally, in weighing the possible seriousness of these issues, it is worth considering national data on the misuse of prescription drugs over time. Between 2006 and 2011, the nonmedical use of the stimulant Adderall reportedly rose 67%, and emergency room visits went up 156% (Chen et al., 2016). Increasing misuse was particularly pronounced among 18- to 25-year-olds (often used as study aids in college); these young adults usually procured the medications from family and friends (Chen et al., 2016). In analyses of trends spanning 2004–2013, researchers documented significant increases in emergency department visits for drug overdoses among children and adolescents, with most poisonings resulting from unsupervised exposure to opioids (including pain medications such as oxycodone), followed closely by benzodiazepines or tranquilizers (Lovegrove, Weidle, & Budnitz, 2015). Finally, analyses of patterns between 1997 and 2012 showed significant increases in opioid poisonings among 15- to 19-year-olds (Gaither, Leventhal, Ryan, & Camenga, 2016). Besides suicidal intent, poisonings occurred because of recreational misuse and self-medication for depression or anxiety, and once again, most teens obtained the drugs from friends or family (Gaither et al., 2016; Hirshman, 2017). Obviously, the ability to obtain all these controlled substances is easiest for young adults who have ample discretional spending money.

Future directions

In the years ahead, our findings suggest the need for more focused research on substance use in teens in upper middle class communities. It has been noted that acquiring these samples in developmental research can be difficult given the high emphasis on privacy of students (some of whom have well-known parents); furthermore, even when school-based assessments are obtained, following them over time can be complicated as monetary incentives for participation are not adequate as many are well-off (Luthar et al., 2013). As was the case

https://doi.org/10.1017/S0954579417000645 Published online by Cambridge University Press

with the accelerated scientific attention to youth in poverty when they were recognized as being at risk for adjustment problems (see Huston, McLoyd, & Garcia Coll, 1994), we would suggest that there is value in future initiatives seeking focused research on this subgroup of youth. Useful, for example, could be requests for proposals with funds allocated to studies on the onset, ontogenesis, and potential mitigation of drug and alcohol use among teens growing up in relatively affluent schools and communities.

In future prospective research and with large enough samples, it will be important to tease apart long-term effects, on youth, of demographic indices not examined here, with appropriate significance testing. As suggested at the outset of this paper, for example, parents' income or education levels might contribute less unique variance to high substance use than does growing up in schools and communities with mostly high SES families (Coley et al., 2017; Jensen, Chassin, & Gonzales, 2017; Lund et al., 2017; Odgers, Donley, Caspi, Bates, & Moffitt, 2015; Trim & Chassin, 2008). In addition, it will be important to disentangle effects of ethnicity (Crosnoe, 2009). In this study as in the general population, families with high SES disproportionately included Caucasians. Finally, with larger samples (and thus greater power to detect significance given relatively low-incidence problems), there is value in exploring if there are any long-term associations between high school parent containment and later psychiatric diagnoses of dependence on different substances, and if there are, whether these too might be mediated by levels of use during the high school years.

In conclusion, results of this study suggest the value of more systematic, long-term studies on a population that is quite possibly at considerable risk for problems of addiction: youth raised in relatively well-to-do school and community settings. Although by no means decisive, the patterns documented are troubling given their consistency across two independent cohorts, different sets of measures (questionnaires and interviews), and across 10 annual assessments, considered cumulatively. Prospective studies of any at-risk groups are rarely pursued without some initial evidence of long-term problems. As results of this study show little evidence that participants matured out of serious alcohol and drug misuse well into their 20s, we hope that this work will, at the least, serve as "preliminary data" for long-term, contextually sensitive research on problems of substance misuse among children in upwardly mobile communities. Over time, such research could prove invaluable for a sizeable group of youth whose vulnerability is profound, but remains largely unacknowledged in science, prevention, and public policy.

References

Abar, C. C., Jackson, K. M., & Wood, M. (2014). Reciprocal relations between perceived parental knowledge and adolescent substance use and delinquency: The moderating role of parent–teen relationship quality. *Developmental Psychology*, *50*, 2176–2187. doi:10.1037/a0037463

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders: DSM- IV* (4th ed.). Washington, DC: Author.

Andrews, J. A., Tildesley, E., Hops, H., & Li, F. (2002). The influence of peers on young adult substance use. *Health Psychology*, *21*, 349. doi:10.1037//0278-6133.21.4.349

Arnett, J. J. (2005). The developmental context of substance use in emerging adulthood. *Journal of Drug Issues*, *35*, 235–254. doi:10.1177/002204260503500202

Arnett, J. J. (2007). Emerging adulthood: What is it, and what is it good for? *Child Development Perspectives*, *1*, 68–73. doi:10.1111/j.1750-8606.2007.00016.x

Arria, A. M., Bugbee, B. A., Caldeira, K. M., & Vincent, K. B. (2014). Evidence and knowledge gaps for the association between energy drink use and high-risk behaviors among adolescents and young adults. *Nutrition Reviews*, *72*, 87–97. doi:10.1111/nure.12129

Bachman, J. G., Wadsworth, K. N., O'Malley, P. M., Johnston, L. D., & Schulenberg, J. E. (1997). *Smoking, drinking, and drug use in young adulthood: The impacts of new freedoms and new responsibilities*. Mahwah, NJ: Erlbaum.

Botticello, A. L. (2009). School contextual influences on the risk for adolescent alcohol misuse. *American Journal of Community Psychology*, *43*, 85–97. doi:10.1007/s10464-008-9226-4

Boyle, J. R., & Boekeloo, B. O. (2006). Perceived parental approval of drinking and its impact on problem drinking behaviors among first-year college students. *Journal of American College Health*, *54*, 238–244. doi:10.3200/JACH.54.4.238-244

Bui, Q., & Dougherty, C. (2017). Good schools, affordable homes: Finding suburban sweet spots. *New York Times*. Retrieved from https://www.nytimes.com/interactive/2017/03/30/upshot/good-schools-affordable-homes-suburban-sweet-spots.html?_

Carrick, A. K. (2016). Drinking to blackout. *New York Times*. Retrieved from http://www.nytimes.com/2016/09/19/opinion/drinking-to-blackout.html

Chase, S. A. (2008). *Perfectly prep: Gender extremes at a New England prep school*. New York: Oxford University Press.

Chen, L. Y., Crum, R. M., Strain, E. C., Alexander, G. C., Kaufmann, C., & Mojtabai, R. (2016). Prescriptions, nonmedical use, and emergency department visits involving prescription stimulants. *Journal of Clinical Psychiatry*, *77*, e297–e304. doi:10.4088/JCP.14m09291

Chen, P., & Jacobson, K. C. (2013). Longitudinal relationships between college education and patterns of heavy drinking: A comparison between Caucasians and African-Americans. *Journal of Adolescent Health*, *53*, 356–362. doi:10.1016/j.jadohealth.2013.04.003

Cicchetti, D. (1984). The emergence of developmental psychopathology. *Child Development*, *55*, 1–7. doi:10.2307/1129830

Cohen, D. A., & Rice, J. (1997). Parenting styles, adolescent substance use, and academic achievement. *Journal of Drug Education*, *27*, 199–211.

Coley, R. L., Sims, J., Dearing, E., & Spielvogel, B. (2017). Locating economic risks for adolescent well-being: Poverty and affluence in families, schools, and neighborhoods. *Child Development*. Advance online publication. doi:10.1111/cdev.12771

Crosnoe, R. (2009). Low-income students and the socioeconomic composition of public high schools. *American Sociological Review*, *74*, 709–730. doi:10.1177/000312240907400502

Dantzer, C., Wardle, J., Fuller, R., Pampalone, S. Z., & Steptoe, A. (2006). International study of heavy drinking: Attitudes and sociodemographic factors in university students. *Journal of American College Health*, *55*, 83–90. doi:10.3200/JACH.55.2.83-90

Deng, Y., Hillygus, D. S., Reiter, J. P., Si, Y., & Zheng, S. (2013). Handling attrition in longitudinal studies: The case for refreshment samples. *Statistical Science*, *28*, 238–256.

Dreier, P. (2014). America's classist education system. *The Huffington Post*. Retrieved from http://www.huffingtonpost.com/peter-dreier/americas-rigged-education_b_5621332.html

Ellickson, P. L., Martino, S. C., & Collins, R. L. (2004). Marijuana use from adolescence to young adulthood: Multiple developmental trajectories and their associated outcomes. *Health Psychology*, *23*, 299. doi:10.1037/0278-6133.23.3.299

Ellickson, S. L., Tucker, J. S., Klein, D. J., & McGuigan, K. A. (2001). Prospective risk factors for alcohol misuse in late adolescence. *Journal of Studies on Alcohol*, *62*, 773–782. doi:10.15288/jsa.2001.62.773

Enders, C. K. (2010). *Applied missing data analysis*. New York: Guilford Press.

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling*, *8*, 430–457.

Fletcher, A. C., Steinberg, L., & Williams-Wheeler, M. (2004). Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. *Child Development*, *75*, 781–796.

Gaither, J. R., Leventhal, J. M., Ryan, S. A., & Camenga, D. R. (2016). National trends in hospitalizations for opioid poisonings among children and adolescents, 1997 to 2012. *JAMA Pediatrics*, *170*, 1195–1201. doi:10.1001/jamapediatrics.2016.2154

Gendaszek, A. E., & Low, K. G. (2002). Illicit use of psychostimulants among college students: A preliminary study. *Psychology, Health & Medicine*, *7*, 283–287. doi:10.1080/13548500220139386

Givens, M., Gennuso, K., Jovaag, A., & Van Dijk, J. W. (2017). *2017 County Health Rankings: Key findings report*. Madison, WI: University of Wisconsin Population Health Institute. Retrieved from http://www.countyhealthrankings.org/reports/2017-county-health-rankings-key-findings-report

Glatz, T., Stattin, H., & Kerr, M. (2012). A test of cognitive dissonance theory to explain parents' reactions to youths' alcohol intoxication. *Family Relations*, *61*, 629–641. doi:10.1111/j.1741-3729.2012.00723.x

Grant, B. F., Stinson, F. S., & Harford, T. C. (2001). Age at onset of alcohol use and DSM-IV alcohol abuse and dependence: A 12-year follow-up. *Journal of Substance Abuse*, *13*, 493–504. doi:10.1016/S0899-3289(01)00096-7

Griffin, K. W., Samuolis, J., & Williams, C. (2011). Efficacy of a self-administered home-based parent intervention on parenting behaviors for preventing adolescent substance use. *Journal of Child and Family Studies*, *20*, 319–325. doi:10.1007/s10826-010-9395-2

Hartman, J., Corbin, W., Luthar, S. S., Van Lenten, S., Dishion, T., Doane, L., & Ha, T. (2016, October). *Parent–child relationship quality: A potential moderator in the link between parental containment and alcohol use before the transition to college*. Paper presented at the 50th Annual Association for Behavioral and Cognitive Therapies Meeting, New York, October 27–30

Hirshman, R. (2017, January/February). Kids caught in the opioid crisis. *Yale Alumni Magazine*, p. 30. Retrieved from https://yalealumnimagazine.com/articles/4432-kids-caught-in-the-opioid-crisis

Hoffmann, J. P., & Bahr, S. J. (2014). Parenting style, religiosity, peer alcohol use, and adolescent heavy drinking. *Journal of Studies on Alcohol and Drugs*, *75*, 222–227.

Humensky, J. L. (2010). Are adolescents with high socioeconomic status more likely to engage in alcohol and illicit drug use in early adulthood? *Substance Abuse Treatment, Prevention, and Policy*, *5*, 19. doi:10.1186/1747-597X-5-19

Hussey, K., & Schlossberg, T. (2015). 12 at Wesleyan University are hospitalized for drug overdoses. *New York Times.* Retrieved from http://www.nytimes.com/2015/02/24/nyregion/12-at-wesleyan-university-hospitalized-for-drug-overdoses.html

Huston, A. C., McLoyd, V. C., & Coll, C. G. (1994). Children and poverty: Issues in contemporary research. *Child Development*, *65*, 275–282. doi:10.1111/j.1467-8624.1994.tb00750.x

Jackson, K. M., Sher, K. J., Gotham, H. J., & Wood, P. K. (2001). Transitioning into and out of large-effect drinking in young adulthood. *Journal of Abnormal Psychology*, *110*, 378. doi:10.1037//0021-843X.110.3.378

Jensen, M., Chassin, L., & Gonzales, N. (2017). Neighborhood moderation of sensation seeking effects on adolescent substance use initiation. *Journal of Youth and Adolescence*. Advance online publication. doi:10.1007/s10964-017-0647-y

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2012). *Monitoring the Future national results on adolescent drug use: 2012 overview, key findings on adolescent drug use*. Ann Arbor, MI: University of Michigan, Institute for Social Research.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Miech, R. A. (2014). *Monitoring the Future national survey results on drug use, 1975–2013: Vol. II. College students and adults ages 19–55*. Ann Arbor, MI: University of Michigan, Institute for Social Research.

Kerr, M., Stattin, H., & Özdemir, M. (2012). Perceived parenting style and adolescent adjustment: Revisiting directions of effects and the role of parental knowledge. *Developmental Psychology*, *48*, 1540–1553. doi:10.1037/a0027720.1540

Kessler, R. C., Berglund, P., Chiu, W. T., Demler, O., Heeringa, S., Hiripi, E., . . . Zheng H. (2004). The US National Comorbidity Survey Replication (NCS-R): Design and field procedures. *International Journal of Methods in Psychiatric Research*, *13*, 69–92. doi:10.1002/mpr.167

Koplewicz, H. S., Gurian, A., & Williams, K. (2009). The era of affluence and its discontents. *Journal of the American Academy of Child & Adolescent Psychiatry*, *48*, 1053–1055. doi:10.1097/CHI.0b013e3181b8be5c

LaBrie, J. W., Hummer, J. F., & Pedersen, E. R. (2007). Reasons for drinking in the college student context: The differential role and risk of the social motivator. *Journal of Studies on Alcohol and Drugs*, *68*, 393. doi:10.15288/jsad.2007.68.393

Lee, C. T., McClernon, F. J., Kollins, S. H., Prybol, K., & Fuemmeler, B. F. (2013). Childhood economic strains in predicting substance use in emerging adulthood: Mediation effects of youth self-control and parenting practices. *Journal of Pediatric Psychology*, *38*, 1130–1143. doi:10.1093/jpepsy/jst056

Lovegrove, M. C., Weidle, N. J., & Budnitz, D. S. (2015). Trends in emergency department visits for unsupervised pediatric medication exposures, 2004–2013. *Pediatrics*, *136*, e821–e829. doi:10.1542/peds.2015-2092

Lund, T. J., Dearing, E., & Zachrisson, H. D. (2017). Is affluence a risk for adolescents in Norway? *Journal of Research on Adolescence. Advance online publication*. doi:10.1111/jora.12304

Luthar, S. S., & Barkin, S. H. (2012). Are affluent youth truly "at risk"? Vulnerability and resilience across three diverse samples. *Development and Psychopathology*, *24*, 429–449. doi:10.1017/S0954579412000089

Luthar, S. S, Barkin, S. H., & Crossman, E. J. (2013). I can, therefore I must: Fragility in the upper-middle classes. *Development and Psychopathology*, *25*, 1529–1549. doi:10.1017/S0954579413000758

Luthar, S. S., & D'Avanzo, K. (1999). Contextual factors in substance use: A study of suburban and inner-city adolescents. *Development and Psychopathology*, *11*, 845–867. doi:10.1017/S0954579499002357

Luthar, S. S., & Goldstein, A. S. (2008). Substance use and related behaviors among suburban late adolescents: The importance of perceived parent containment. *Development and Psychopathology*, *20*, 591–614. doi:10.1017/S0954579408000291

Lyman, E. L., & Luthar, S. S. (2014). Further evidence on the "costs of privilege": Perfectionism in high-achieving youth at socioeconomic extremes. *Psychology in the Schools*, *51*, 913–930.

MacKinnon, D. P. (2008). *Introduction to statistical mediation analysis*. Mahwah, NJ: Erlbaum.

Maggs, J. L., & Schulenberg, J. E. (2004). Trajectories of alcohol use during the transition to adulthood. *Alcohol Research and Health*, *28*, 195–201.

Marano, H. E. (2005). Rocking the cradle of class. *Psychology Today*, *38*, 52–58.

Mason, W. A., & Spoth, R. L. (2011). Longitudinal associations of alcohol involvement with subjective well-being in adolescence and prediction to alcohol problems in early adulthood. *Journal of Youth and Adolescence*, *40*, 1215–1224. doi:10.1007/s10964-011-9632-z

Messler, E. C., Quevillon, R. P., & Simons, J. S. (2014). The effect of perceived parental approval of drinking on alcohol use and problems. *Journal of Alcohol and Drug Education*, *58*, 44–59.

Moffitt, T. E., Caspi, A., Taylor, A., Kokaua, J., Milne, B. J., Polanczyk, G., & Poulton, R. (2010). How common are common mental disorders? Evidence that lifetime prevalence rates are doubled by prospective versus retrospective ascertainment. *Psychological Medicine*, *40*, 899–909. doi:10.1017/S0033291709991036

Moore, D. R., Burgard, D. A., Larson, R. G., & Ferm, M. (2014). Psychostimulant use among college students during periods of high and low stress: An interdisciplinary approach utilizing both self-report and unobtrusive chemical sample data. *Addictive Behaviors*, *39*, 987–993. doi:10.1016/j.addbeh.2014.01.021

Moss, H. B., Chen, C. M., & Yi, H. Y. (2014). Early adolescent patterns of alcohol, cigarettes, and marijuana polysubstance use and young adult substance use outcomes in a nationally representative sample. *Drug and Alcohol Dependence*, *136*, 51–62. doi:10.1016/j.drugalcdep.2013.12.011

Muthén, B., & Muthén, L. (2013). Mplus 7.1 [Computer software]. Los Angeles: Author.

National Comorbidity Study. (2005). *Instruments*. Cambridge, MA: Harvard Medical School. Retrieved from http://www.hcp.med.harvard.edu/ncs/instruments.php

National Institute on Drug Abuse. (2014). *Costs of substance abuse.* Retrieved from http://www.drugabuse.gov/related-topics/trends-statistics

Odgers, C. L., Donley, S., Caspi, A., Bates, C. J., & Moffitt, T. E. (2015). Living alongside more affluent neighbors predicts greater involvement

in antisocial behavior among low-income boys. *Journal of Child Psychology and Psychiatry*, *56*, 1055–1064. doi:10.1111/jcpp.12380

O'Hara, R. E., Armeli, S., & Tennen, H. (2015). College students' drinking motives and social-contextual factors: Comparing associations across levels of analysis. *Psychology of Addictive Behaviors*, *29*, 420. doi:10.1037/adb0000046

Olino, T. M., Yu, L., Klein, D. N., Rohde, P., Seeley, J. R., Pilkonis, P. A., & Lewinsohn, P. M. (2012). Measuring depression using item response theory: An examination of three measures of depressive symptomatology. *International Journal of Methods in Psychiatric Research*, *21*, 76–85. doi:10.1002/mpr.1348

Pardini, D. A. (2008). Novel insights into longstanding theories of bidirectional parent–child influences: Introduction to the special section. *Journal of Abnormal Child Psychology*, *36*, 627–631. doi:10.1007/s10802-008-9231-y

Patrick, M. E., Wightman, P., Schoeni, R. F., & Schulenberg, J. E. (2012). Socioeconomic status and substance use among young adults: A comparison across constructs and drugs. *Journal of Studies on Alcohol and Drugs*, *73*, 772–782. doi:10.15288/jsad.2012.73.772

Pell Institute. (2015). *Indicators of higher education equity in the United States*. Retrieved from http://www.pellinstitute.org/downloads/publications-Indicators_of_Higher_Education_Equity_in_the_US_45_Year_Trend_Report.pdf

Racz, S. J., & McMahon, R. J. (2011). The relationship between parental knowledge and monitoring and child and adolescent conduct problems: A 10-year update. *Clinical Child and Family Psychology Review*, *14*, 377–398. doi:10.1007/s10567-011-0099-y

Reboussin, B. A., Preisser, J. S., Song, E. Y., & Wolfson, M. (2010). Geographic clustering of underage drinking and the influence of community characteristics. *Drug and Alcohol Dependence*, *106*, 38–47. doi:10.1111/j.1530-0277.2011.01491.x

Reifman, A., & Watson, W. K. (2003). Binge drinking during the first semester of college: Continuation and desistance from high school patterns. *Journal of American College Health*, *52*, 73–81. doi:10.1080/07448480309595727

Reyna, V. F., & Mills, B. A. (2014). Theoretically motivated interventions for reducing sexual risk taking in adolescence: A randomized controlled experiment applying fuzzy-trace theory. *Journal of Experimental Psychology: General*, *143*, 1627–1648. doi:10.1037/a0036717

Robins, L. N., Cottler, L. B., Compton, W. M., Bucholz, K., North, C. S., & Rourke, K. M. (2000). *Diagnostic Interview Schedule for the DSM-IV (DIS-IV)*. St. Louis, MO: Washington University.

Rose, P., Smith, S. T., & Segrist, D. J. (2010). Too cheap to chug: Frugality as a buffer against college-student drinking. *Journal of Consumer Behaviour*, *9*, 228–238. doi:10.1002/cb.314

Rothman, S. (2009). *Estimating attrition bias in the Year 9 cohorts of the Longitudinal Surveys of Australian Youth* (Technical Report No. 48). Melbourne: Australian Council for Educational Research.

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, *7*, 147–177.

Schiffman, K. (2011). Study on suburban heroin use dispels myths about protective and risk factors. *Huffington Post*. Retrieved from http://www.huffingtonpost.com/2011/10/20/suburban-heroin-use-study_n_1019629.html

Schulenberg, J. E., & Zarrett, N. R. (2006). Mental health during emerging adulthood: Continuity and discontinuity in courses, causes, and functions. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of age in the 21st century* (pp. 135–172). Washington, DC: American Psychological Association.

Song, E. Y., Reboussin, B. A., Foley, K. L., Kaltenbach, L. A., Wagoner, K. G., & Wolfson, M. (2009). Selected community characteristics and underage drinking. *Substance Use & Misuse*, *44*, 179–194. doi:10.1080/10826080802347594

Steinman, K. J. (2003). College students' early cessation from episodic heavy drinking: Prevalence and correlates. *Journal of American College Health*, *51*, 197–204. doi:10.1080/07448480309596351

Substance Abuse and Mental Health Services Administration. (2012). *Results from the 2011 National Survey on Drug Use and Health: Summary of national findings*. Washington, DC: US Department of Health and Human Services.

Takayanagi, Y., Spira, A. P., Roth, K. B., Gallo, J. J., Eaton, W. W., & Mojtabai, R. (2014). Accuracy of reports of lifetime mental and physical disorders: Results from the Baltimore Epidemiological Catchment Area study. *JAMA Psychiatry*, *71*, 273–280. doi:10.1001/jamapsychiatry.2013.3579

Trim, R. S., & Chassin, L. (2008). Neighborhood socioeconomic status effects on adolescent alcohol outcomes using growth models: Exploring the role of parental alcoholism. *Journal of Studies on Alcohol and Drugs*, *69*, 639–648. doi:10.15288/jsad.2008.69.639

Turrisi, R., Wiersma, K. A., & Hughes, K. K. (2000). Binge-drinking-related consequences in college students: Role of drinking beliefs and mother–teen communications. *Psychology of Addictive Behaviors*, *14*, 342. doi:10.1037/0893-164X.14.4.342

Uestuen, B., & Kennedy, C. (2009). What is "functional impairment"? Disentangling disability from clinical significance. *World Psychiatry*, *8*, 82–85. doi:10.1002/j.2051-5545.2009.tb00219.x

United States Bureau of the Census. (2015). *Quick facts*. Retrieved from https://www.census.gov/quickfacts/table/PST045215/3665431,0983570

Visser, L., de Winter, A. F., Vollebergh, W. A., Verhulst, F. C., & Reijneveld, S. A. (2013). The impact of parenting styles on adolescent alcohol use: The TRAILS study. *European Addiction Research*, *19*, 165–172.

Vrecko, S. (2015). Everyday drug diversions: A qualitative study of the illicit exchange and non-medical use of prescription stimulants on a university campus. *Social Science & Medicine*, *131*, 297–304. doi:10.1016/j.socscimed.2014.10.016

Wechsler, H., Lee, J. E., Kuo, M., Seibring, M., Nelson, T. F., & Lee, H. (2002). Trends in college binge drinking during a period of increased prevention efforts: Findings from 4 Harvard School of Public Health college alcohol study surveys: 1993–2001. *Journal of American College Health*, *50*, 203–217. doi:10.1080/07448480209595713

Wechsler, H., & Nelson, T. F. (2008). What we have learned from the Harvard School of Public Health College Alcohol Study: Focusing attention on college student alcohol consumption and the environmental conditions that promote it. *Journal of Studies on Alcohol and Drugs*, *69*, 481. doi:10.15288/jsad.2008.69.481

White, B. P., Becker-Blease, K. A., & Grace-Bishop, K. (2006). Stimulant medication use, misuse, and abuse in an undergraduate and graduate student sample. *Journal of American College Health*, *54*, 261–268. doi:10.3200/JACH.54.5.261-268