

Affluent Youth in Emerging Adulthood: Evidence of Elevated Substance Use Relative to Norms

by

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ABSTRACT

The primary goal of this study was to investigate whether youth from an affluent community showed elevated rates of substance use and associated problems in young adulthood relative to national norms. The secondary goal was to determine if parents' "containment," or stringent disciplinary action, of adolescent substance use as measured in Grade 12 could help predict substance use in senior year of college, over and above other parenting factors. The final goal was to assess trends of substance use over time for stability based on categories of participants' overall levels of use in Grade 12, (low, medium, high). Results indicated that substance use remained elevated into young adulthood, relative to national norms, consistent with extant research involving upper middle class youth. In regression analyses, high parents' containment was associated with low substance use in senior year of college; however, the inclusion of Grade 12 use as a covariate reduced this association with containment such that it was no longer statistically significant. Such results suggest a mediated effect, with Grade 12 substance use mediating the effects of Grade 12 Containment on college senior year substance use. Finally, upper middle class youth were found to remain in their relative substance use group (low, medium, high) as determined at Grade 12 through all four years of college. Taken together, these results emphasized the importance of high school substance use behaviors as a notable risk factor for problematic substance use over time.

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Affluent Youth in Emerging Adulthood: Evidence of Elevated Substance Use Relative to Norms

Recurrently identified as an “at-risk group” (Koplewicz, Gurian, & Williams, 2009; Luthar & Barkin, 2012), teens from upper-middle class families have been shown to have higher levels of substance use and adjustment problems as compared with national norms, with findings replicated through middle and high school (Luthar, Barkin, & Crossman, 2013). This study extended prior work on this population in two ways, including expanding generalizability of findings to affluent youth more broadly, and describing the duration of substance use problems into adulthood. Using similar methods and measures as the existing studies on affluent youth, data were presented on a new, geographically distinct cohort of affluent youth. Second, the study encompassed data spanning the developmentally critical years of emerging adulthood – 12th grade through all four years of college.

This study is largely descriptive in nature, though it includes predictive analyses as well. Rates of substance use in this sample were compared with national norms, considering alcohol and different drugs, individually. Using what is known about the association between positive parenting practices (i.e. parental awareness, and containment or stringent disciplinary actions) and early substance use, regression analyses were used to determine the longitudinal associations between containment in high school with substance use in senior year of college. Finally, participants were grouped into Grade 12 substance use categories (low, medium, and high), and those groups were tracked over time to explore stability in overall substance use levels over time. The sample used in this study was similar to those in prior reports of “affluent youth”, that is, those growing up in communities that are predominantly white-collar, well-educated families, attending schools with very high achievement test scores and rich extracurricular offerings (Luthar et al., 2013).

Substance use in the United States

The costs of substance use and abuse remain high in the U.S., impacting individuals, families, and communities nationwide, and increasingly, high rates of this problem have been documented in high SES groups (Patrick, Wightman, Schoeni, & Schulenberg, 2012). Between the costs of lost productivity at work, crime, and healthcare, the estimated annual expense was

over \$600 billion dollars in the United States last year (National Institute on Drug Abuse, 2014). The cost is not only financial; there can be significant detriments to neuropsychological and academic functioning for long-term marijuana users (Meier et al., 2012; Meier, Hill, Small, & Luthar, in press).

Substance use has become increasingly more serious in upper middle class teens, as noted in high-profile national news stories (Buckley, 2009; Goodman, 2014; Rubin, 2013) and research alike (Bachman, O'Malley, Johnston, Schulenberg, & Wallace, 2011; Luthar et al., 2013; Patrick et al., 2012). Much of the existing research on substance use among affluent youth has been based on high school samples. It remains to be seen if these harmful behaviors continue into the college years as well.

Developmental research has suggested that some heavy drinkers or substance users might simply “age out” of their use. In general, as adolescents transition into early adulthood, the increases in responsibility and maturity may lead to a decrease in substance use behavior. On the other hand, it is possible that many might continue or even increase their use of substances. Substance use during high school has been shown to be the best predictor of use during college (Reifman & Watson, 2003), as adolescents who drank and used drugs in high school tended to continue those habits in college, where there is typically a drastic increase in independence and autonomy and decrease in parental oversight. Even when drinking is reduced, it does not necessarily connote absence of risk. As Lee, Chassin, and Villalta (2013) demonstrated, even when high-risk drinkers between the ages of 23-28 showed some reduction in use over time, they did not entirely eliminate their drinking behavior. In other research, those who engaged in early drinking or experimenting were at an increased risk, compared with non-drinkers, for multiple substance use problems (Mason & Spoth, 2011). Whether affluent youth tend to increase or decrease their substance use into early adulthood is presently unknown.

Additional “risk factors” involved college customs around drinking and drug use. Alcohol and substance use remain a common part of college cultures today, with rates of binge drinking as high as 44% among undergraduate students (Wechsler & Nelson, 2008; Wechsler et al., 2002). Continuing into the mid-20's, drinking to get drunk has been shown to be quite common in

social gatherings among college graduates (Maggs & Schulenberg, 2004). Slutske and colleagues (2004) demonstrated that college students drink more than their non-college attending peers. Further, harmful drinking habits have been shown to be more pronounced in students from well-educated families (Dantzer, Wardle, Fuller, Pampalone, & Septoe, 2006). Additionally, Rozenboek and Rothstein (2011) showed that non-medical users of prescription medications in college (particularly Adderall and Ritalin) tended to use combinations of substances; to share these drugs with friends; and to use these drugs—particularly stimulants—in a social context.

It should be emphasized that although drinking has been viewed as an acceptable social behavior, it has not been without its risks. Hingson, Zha, and Weitzman (2009) estimated that about 1,825 college students die each year from alcohol-related events (i.e. motor vehicle accidents). The same authors estimated that approximately 700,000 students are assaulted by other students who are under the influence each year, and about 97,000 students are victims of sexual assault or date rape while alcohol is being used. College and university administrators cited students' drinking as a primary concern related to their student body (DeJong & Langford, 2002), and the US Department of Health and Human Services even set an objective to reduce binge drinking in young people (Scott-Sheldon, Demartini, Carey, & Carey, 2009).

Aside from alcohol, there are other substances that could be significantly elevated among affluent youth than national norms, including marijuana, Ritalin/Adderall, and even cocaine. Increasingly, there have been reports in both science (Arria et al., 2008; Kaperski et al., 2011; Rozenbroek & Rothstein, 2011) and the media (Lieber, 2015; Schulman, 2008; Schwartz, 2012; Szalavitz, 2012) suggesting that these substances are not just used recreationally in social situations, but in the case of Ritalin/ Adderall, as a study aid in colleges with demanding academic curricula. In view of all these factors, participants in this study of relatively affluent youth were compared to national norms for college students to ascertain the level of risk in this population.

Containment

In terms of a socializing influence that might help keep adolescents' substance use in check, the notion of parent containment appears to be of considerable significance among

affluent populations. Across high school samples, perceived parent containment -- or the belief that parents will enforce rules and hold adolescents accountable (Schneider, Cavell, & Hughes, 2003) for “bad” behavior – has been shown to be a protective factor in a teen’s involvement with alcohol and drug use, with links significant over and above other parenting factors including parental awareness (Luthar & Goldstein, 2008; Luthar & Barkin, 2012). Although containment and parental awareness have both been associated with reduced risk of drug use in Grade 12, the long-term protective potential of containment is presently unknown. Thus, in this study, a second goal was to examine whether adolescents’ perceptions of parents’ containment in regard to substance use in high school might have an enduring long-term effect on levels of substance use in early adulthood, over and above the effect of parental awareness. Outcomes to be considered here were two expected to show a range of use frequencies in this sample by college senior year: being drunk and marijuana use.

Abrupt increases among high school abstainers?

Finally, exploratory analyses were conducted to explore the degree to which high, moderate, and low levels of substance use show continuity across the transition from school to college. On the one hand, there is much evidence, as previously noted, that the best predictors of college levels of substance use are the levels of use demonstrated in prior years. On the other hand, it is plausible that on entry into college, significant spikes in use may occur among some students who abstained entirely from using during high school (e.g., because of highly vigilant and strict parents). Accordingly, three groups based on high school use were tracked to document their relative levels of use from freshman through senior years of college.

Summary

The purpose of this study was to test the hypothesis that affluent youth continued to display high-risk behavior in young adulthood in the form of elevated levels of alcohol and drug use relative to national norms. It was hypothesized that these young adults would demonstrate higher rates of overall alcohol use (specifically drunkenness), as well as rates of marijuana, cocaine, and Ritalin/Adderall use as compared with national norms. As men have been shown to

use some substances at higher rates than women (see Johnston, O'Malley, Bachman, & Schulenberg, 2012), all analyses are presented separately by sex.

Secondary analyses examined whether high school parent containment was related to substance use in senior year of college. Effects of containment were hypothesized to have associations with later use levels controlling for gender, and after considering the more commonly examined dimension of Grade 12 parental awareness of their children's activities and whereabouts.

Finally, this study assessed substance use behaviors from Grade 12 through the full course of college, to explore continuity versus discontinuity in overall substance use levels. It was hypothesized that medium and high use groups would remain in their relative position throughout college, but that students who were low in use during high school would show sharp increases in their use during freshman year of college.

Method

Sample

The sample consisted of students similar to those that have been described in the New England Study of Suburban Youth (NESSY, see Luthar & Barkin, 2012), which assessed students annually from Grades 6-12. Participants in the current cohort – called NESSY-2 in the interest of brevity – were from a very similar suburban community but in a neighboring state in the Northeast. Participants in NESSY-2 were assessed annually for 5 years since 2010, when they were in the 12th grade through their final year of college.

When the study began, the sample consisted of 269 participants (123 females and 145 males; 1 participant is missing gender data). The participants identified as 79.6% non-Hispanic White, 10.8% Asian, 3.3% multiracial, 3% African American, and 1.9% Hispanic. The majority of participants had married parents (84.8%), and mothers and fathers of the youth were generally well educated (55.0% and 63.6% with graduate degrees, respectively). The median income of this particular community was \$232,422, which was approximately 4.7 times the national median of \$49,445 in 2010 (United States Bureau of the Census, 2010).

In 2010, when participants had just completed Grade 12 (age 18), 269 subjects participated in the school-based assessment. In their first year of college, 135 of these 269 students participated and four years later, when participants had completed their senior year of college (age 22), 151 (78 female) subjects participated, representing 56.13% of the total starting (Grade 12) *n*. This retention rate compares favorably to other longitudinal studies, including the national Monitoring the Future (MTF) study (Johnston et al., 2013), which reports a 54% retention rate for the equivalent time-span. Total *n*'s at each wave, from 12th grade through senior year of college, were 269, 135, 150, 160, and 151, respectively (at each wave, students were invited to join even if they had not participated in preceding waves of data collection, resulting in slightly varying rates of participation over time).

Analyses of variance were employed to test for attrition biases based on possible differences between ongoing study participants and study “drop-outs” by senior year of college. Results showed no differences across most 12th grade indicators (Appendix C). Drop-outs did had higher overall past year substance use ($F(1,264) = 7.83, p = .006$), but Cohen's *d* effect size value ($d = -.10$) suggested limited practical significance. Overall, these analyses indicate that the sample is fairly representative of the original NESSY-2 cohort over time but some of the students at greatest risk for substance use may not be represented in the range of college assessments.

Procedure

Data collection occurred in May of each school year from 2010-2015. During high school, data collection involved a questionnaire distributed to students, and during the college years, it involved a phone-based diagnostic interview (Robins et al., 2000; see “Measures” for details) and online questionnaires.

Students' participation was based on passive consent procedures in the 12th grade, as data were collected as part of a school-based initiative promoting positive youth development. Participants were asked to complete a questionnaire in school that would help describe and understand adolescents' everyday feelings and behaviors. Parents of these participants provided consent, and students provided assent.

In subsequent assessments across the college years, consent was obtained via verbal (interview) and computer-based (questionnaire) consent forms. Across all assessments, participants were free to decline, or cease participation at any point without consequence. Modest monetary incentives were offered to participants in high school (\$10 Amazon gift card), with the value increasing in college (\$125 for participation in freshman year, and \$150 in subsequent years). Participants were paid after completing the diagnostic interview and the online questionnaires, earning up to \$150 total for completing both online questionnaire and diagnostic interview. Upon completion of the surveys and interviews, the data were stored with subject numbers as identifiers, and managed by a trained research team to protect confidentiality.

Measures

Substance Use. Substance use was assessed at each of the 5 assessments from senior year of high school to senior year of college. The substance use questionnaire from the Monitoring the Future study (MTF; Johnston, O'Malley, & Bachman, 1984; Johnston, O'Malley, Bachman, & Schulenberg, 2011-2013) was used to assess the frequency of substance use, including alcohol and marijuana, as well as "hard" drugs, such as amphetamines and cocaine. MTF reported past 30-day substance use as well as yearly substance use, though only yearly rates are reported here because certain 30-day rates were absent in the MTF data. Note that the response categories for the MTF scale were 1-6, with the following numbers corresponding to categories that represented the number of times a substance was used in the past year: 0 = no use in past year; 1 = 1-2 times; 2 = 3-5 times; 3 = 6-9 times; 4 = 10-19 times; 5 = 20-39 times; and 6 = 40+ times in the past year.

Containment. Parental 'containment' of substance use was assessed in 12th grade only, based on Luthar and Goldstein's (2008) 14-item measure using a 5-point scale, assessing the degree of expected parental repercussions regarding different delinquent teen behaviors, including *substance use*, *delinquency*, *rudeness*, and *academic disengagement* (coefficient alphas = .85, .78, .78, and .71 respectively). The *substance use* subscale, composed of 4 items, was used in this study. Questions in this subscale were, "How serious would the consequences be if your parents knew you (a) attended a keg or drinking party without permission; (b) were

smoking marijuana; (c) got drunk; and (d) went to a party where no adults were present, without permission?”

Parental awareness. Parental awareness (e.g., “My parents know how I spend my money”) was assessed in 12th grade by 6 items scored on a 5-point scale ranging from “never” to “always” (coefficient alpha for awareness: .72).

Data Analytic Plan: Preliminary Analyses

Initial analyses showed that the substance use variables were positively skewed. Grade 12 aggregate yearly substance use showed skewness of .92 ($SE = .15$) and kurtosis of .77 ($SE = .30$), while senior year of college aggregate yearly substance use showed skewness of 1.23 ($SE = .20$) and kurtosis of 1.95 ($SE = .39$). A log transformation was performed in order to normalize the data, but this technique did not alter the results that are described below. Thus the untransformed results are presented in the text and tables.

Primary Analyses

First, comparisons with national norms were based on the percentage of NESSY-2 students who reported ever using different substances in the past year with parallel rates in the nationally-representative Monitoring the Future (MTF) study (Bachman et al., 2010). Gender-separated data were compared to those corresponding MTF norms by displaying the ratios of NESSY-2 substance use rates to the nationally-representative rates.

Regression analyses were conducted to assess the influence of parental containment in Grade 12 on the frequency of getting drunk and using marijuana during senior year of college. In these regressions, the influence of Grade 12 parental awareness and gender were included as covariates given their established significance for levels of use (Luthar & Goldstein, 2008). In a second set of analyses, Grade 12 use of the same substances was added as a control covariate (been drunk in Grade 12 when testing been drunk during senior year, marijuana use in Grade 12 when testing the same in senior year). This second set of analyses tested, in essence, whether Grade 12 containment might predict to changes in mean use levels from Grade 12 through senior year of college.

For the final hypothesis, substance use behaviors were assessed from 12th grade through all four years of college. Based on the natural distribution of yearly, aggregate substance use scores in 12th grade, participants were assigned to one of three groups: low, medium, and high Grade 12 substance use. Groups were not created based on pre-existing cutoff scores for low, medium, and high, but rather groups were determined by how the sample in Grade 12 naturally organized into similarly-sized groups. The aggregate substance use means for the low, medium, and high groups for females were: 1.49, 7.46, and 15.00, respectively, and the parallel means for males were: .93, 7.63, and 17.31. The *n*'s and percentages of the total sample for each group were as follows: low use (89, 33.1%), medium use (101, 37.5%), and high use (79, 29.4%). These groups' substance use behaviors were tracked year-to-year for overall substance use, drunkenness, and marijuana use, to determine if low, medium, and high substance users in 12th grade tended to be stable in their use over time relative to the other groups.

Results

Substance use Relative to National Norms

Substance use rates were compared to the MTF rates during the same chronological year in which data were collected (e.g., Grade 12 use during 2010). Each year of college in the NESSY-2 sample was compared to MTF data on college students only, as it is known that rates of use are generally higher among college students than among their same-age counterparts who are not attending college (Slutske et al., 2004). Unfortunately, the latter MTF rates are not available separately by both gender and age, but rather, by gender and the overall ages spanning the college years, i.e. ages 19-22.

Tables 1-5 present these rates for both the NESSY-2 sample and the corresponding MTF norms, as well as a ratio of these rates (NESSY-2/MTF), separately by gender. Overall, these tables display elevations in the percent of NESSY-2 participants reporting past year use compared to national norms in alcohol use, marijuana, cocaine, and prescription medications like Ritalin/Adderall. For example, Table 1 shows that 71.5% of females in the NESSY-2 sample got drunk in the past year in Grade 12, compared to nationally, only 40.8% of females got drunk in the past year during Grade 12. Therefore, the relative risk (or ratio) of getting drunk in Grade 12

for females in this sample was 1.75 times higher than rates in national norms. The ratio for males in this sample compared to national norms was 1.49. Further, in Grade 12, rates of substance use were above the national norms for marijuana use for females and males, with ratios of 1.27 and 1.52, respectively.

Across the college years, as expected, rates for drunkenness, marijuana, Ritalin/Adderall, and cocaine were elevated for males and females across all four years of assessment. Specifically, ratios for drunkenness ranged from 1.28 - 1.62 (median value: 1.37) across the eight values (Tables 2-5), and marijuana ratios ranged between .99 - 1.91 (median value: 1.47). Similarly, ratios of Ritalin/Adderall use ranged from 2.09 - 2.75 (median value: 2.22) in the college years. Notably, rates of cocaine use in the NESSY-2 sample were more than two times the national college-student norms for each gender for all four years of college with the exceptions of females during freshman year of college and males during senior year (ratios ranged from 1.52 - 5.29; median value: 2.53; see Tables 2-5 for college rates and ratios).

For the four substance use dimensions in which elevations were predicted – drunkenness, marijuana, Ritalin/Adderall, and cocaine, rates of use relative to norms across all five annual assessments are shown in Figures 1a-4b separately by gender. These figures clearly show the consistent elevations from high school senior year through the college senior year, for both males and females. In these figures, cross-sectional MTF norms are represented by bars, and the longitudinal NESSY-2 sample means are represented by a line.

Predicting Substance Use in College Year 4

In examining the influence of containment, the first question was whether parental containment predicted substance use in senior year of college. These analyses focused on drunkenness and marijuana use, which represented the substances with the highest levels of use overall, as these entailed enough variability of scores, in the sample as a whole, to which predictors might relate. Outcome variables in these two regressions, therefore, were scores representing the frequency of being drunk, and of marijuana use, respectively, during the college senior year.

Regression analyses showed that containment was significantly associated with lower substance use four years later for drunkenness ($\beta = -.23, p = .01$) and marijuana use ($\beta = -.29, p = .001$). The next question was whether these predictive effects were maintained after controlling for gender. Again, results showed that containment was still significantly associated with drunkenness ($\beta = -.23, p = .01$) and marijuana use ($\beta = -.30, p < .001$) in senior year of college. Finally, after accounting for the influence of gender and parental awareness, higher levels of containment in 12th grade, were significantly associated with lower drunkenness and marijuana in senior year of college (Table 6).

However, once Grade 12 levels of use were also controlled for in the equations, the effects for parental containment were no longer statistically significant. The “Model 1” columns of Table 6 show that parental containment was negatively associated with getting drunk, after accounting for parental awareness and gender ($\beta = -.23, p = .01$), as well as lower rates of marijuana use ($\beta = -.29, p = .001$). The second set of columns in Table 6, “Model 2”, show that once relevant Grade 12 substance use constructs were controlled, the predictive ability of containment disappeared.

Substance Use over Time

Finally, to explore whether substance use remained steady from 12th grade throughout college, three substance use groups were created: low use, medium use, and high use, based on 12th grade aggregate yearly use scores. Overall mean levels of use for these groups were plotted across the four years of college.

Findings showed that all groups tended to increase in substance use steadily from 12th grade into junior year of college, and then decreased during the senior year of college, for both females (Figures 5a-7a) and males (Figures 5b-7b). Still, the Low Use group remained the lowest throughout college, and the High Use group remained the highest, suggesting that patterns of substance use over time remain consistent over time, starting in high school.

Discussion

The current study provides the first report of a prospective dataset from a sample of affluent youth on the rates of substance use relative to national norms, the predictive ability of

containment, and the stability of substance use behaviors into emerging adulthood. Previous studies have assessed other cohorts of affluent youth for substance use trends, but none have included longitudinal data that span grade 12 through all four years of college. Additionally, no previous studies have assessed for the longitudinal effect of containment on college substance use. Finally, the current study addressed whether use behaviors remain relatively stable throughout college, based on grade 12 substance use.

Results suggest that a higher percentage of affluent youth are using substances compared to national norms for 12th graders and college students. Rates of drunkenness, marijuana, Ritalin/Adderall, and cocaine use were consistently elevated. These four substances were originally hypothesized to be problematic due to their social uses (Arria et al., 2008; Kaperski et al., 2011; Maggs & Schulenberg, 2004), as well as Ritalin/Adderall's tendency to also be used as a study aid (Rozenboek & Rothstein, 2011). The elevations in drunkenness observed in this study are consistent with the findings of the high school rates reported by Luthar and Barkin (2012). The four primary substance use categories appear to be elevated consistently over the five annual assessments, providing no support for the possibility of affluent youth "aging out" of using these substances during the college years (ages 18/19 - 22). The lack of a serious decline in use is consistent with more general reports on binge drinking and marijuana use rates, which report a decline in these behaviors closer to ages 26 and above (SAMHSA, 2011). Taken together, results reinforce the claim that substance use is particularly problematic within affluent youth, and that these behaviors must be addressed early to prevent long-term habits from developing.

Secondary analyses revealed that containment in Grade 12 was positively correlated with use of alcohol, marijuana, and Ritalin/Adderall the same year, and that use in Grade 12 was associated with later use during senior year of college, over and above the effects of gender and parental awareness. Thus, the long-term effects of parental containment appeared to operate via its influence on Grade 12 substance use, as containment did not directly predict senior year substance use. This study suggests containment plays an important role in the early development of substance use behaviors, extending previous findings on the effect of containment (Luthar &

Barkin, 2012; Luthar & Goldstein, 2008) by demonstrating its effect on substance use over time. As Grade 12 substance use appeared to predict substance use at age 22, past findings that high school substance use is the best predictor of college substance use (Reifman & Watson, 2003) are replicated here.

Results also indicated that in terms of high, moderate, or low overall use in Grade 12, affluent youth in this cohort tended to use substances at a similar rate across the college years as they did in high school, with no one group changing positions relative to the other groups. In other words, frequency of Grade 12 substance use seemed to remain stable throughout for low, moderate, and high Grade 12 users (Figures 5a-7b). Although youth maintain their relative rates of use over time, several different use groups across genders showed decreases in substance use from junior year to senior year of college (see Figures 5a-7b). This decrease in use could be explained by changing social expectations associated with the final year of college, including students completing college requirements, applying for full time employment, or being admitted to graduate school, though these possible explanations are speculations at present.

When taken together, these findings suggest a significant problem involving alcohol and drug use among affluent youth. During emerging adulthood, substance use is particularly worrisome, as it has been associated with comorbid health outcomes (Caldeira, O'Grady, Vincent, & Arria, 2012), as well as poor mental health outcomes (Weitzman, 2004). The consistent elevations relative to norms over five years do not bode well; previous longitudinal work has shown that prolonged use in late adolescence and early adulthood can lead to more serious problems in adulthood (Lee et al., 2013; Mason & Spoth, 2011). It is well known that early and frequent substance use is highly problematic, often leading to more severe outcomes like addiction and even death (Shah, Lathrop, Reichard, & Landen, 2008). Thus, elevations in substance use documented here are indications of a pervasive problem, as they likely reflect both college and affluent culture.

It has already been established that affluent youth feel immense pressure to succeed throughout high school, which may contribute to substance use during that time (Luthar & Latendresse, 2005; Luthar & Barkin, 2012). Based on this sample's high rates of parents with a

graduate degree, as well as the median family income, it is also possible that these young adults feel growing pressure to meet or exceed the educational and vocational standard established by their parents as they advance through college.

It is relatively common to respond to stress, anxiety, or depression with using substances as a way of self-medicating (Robinson, Sareen, Cox, & Bolton, 2011). As Arnett (2015) explains, this kind of behavior in response to stress is explained by the deficit model, which explains these rates of substance use by pointing to something students may lack (i.e. high school containment). In other words, the deficit model explains substance use behavior by pointing to protective skills or environmental factors that are missing from a user's life. Still, not all substance use in emerging adulthood can be explained by the deficit model, as many college students treat drinking and drug use as a fun, social activity (Arnett, 2005).

This study has several limitations. First, this study relies on data collected from a small sample from a single geographic location. Second, certain illegal substances are not commonly used, both within the NESSY-2 sample and within the MTF norms. As such, when as few as one or two study participants endorsed a certain substance use behavior (i.e. heroin use in the past year), the subsequent ratio of the NESSY-2 sample compared to the MTF norms can appear to be alarmingly inflated. Additionally, the substance use variables that are discussed within this study are positively skewed, as is common within the substance use literature. As such, predictive analyses should be interpreted with caution, and should not be generalized to the larger population of upper middle class youth.

The high rates of yearly use as well as the prolonged effect that containment has on later substance use can help inform both future research and preventive interventions. Most immediately, more geographically distinct samples of upper middle class youth must be assessed for parallel problems with substance use, in order to further improve upon the lack of generalizability within this sub-field. Similarly urgent, work must be done to distinguish between substance use and abuse within upper middle class youth. It will be important to determine if the elevations in past year substance use are similarly reflected in serious problems, meeting criteria for abuse and dependence for all ages assessed here. The case is still being made that

substance use within this subpopulation is problematic, and improving both generalizability as well as substantiating the claim that this use can be serious, and not simply recreational, will be paramount for future work.

In terms of preventive interventions, programs can come in the form of family-, school-, or community-based interventions. Based on the suggested importance of substance use at our earliest time point (Grade 12), we suggest that drug prevention programs are bolstered earlier in school- and community-based programs, in order to influence the culture surrounding these problems. Early interventions, along with stricter policies surrounding drug use in high school and in college are not just recommended, but essential to properly address what is happening within these communities. Prevention programs do exist that target high-risk adolescents and their families, although none have been tailored to fit affluent culture. One evidence-based drug prevention program is the Strengthening Families Program (SFP; Kumpfer, Molgaard, & Spoth, 1996; Kumpfer, Pinyuchon, de Melo, & Whiteside, 2008), which includes parent training, children's skills training, and family skills training for both high-risk 6-12 year-olds and middle schools. In this case, low-income rural families, inner-city youth, and children at risk for displacement due to abuse are all considered to be 'at risk'. This targeted early prevention effort was shown to be effective, and its success strengthens the call for a similarly tailored effort to fit the unique stressors associated with upper middle class youth.

In summary, rates of substance use were elevated over time within this longitudinal cohort of affluent youth. In particular, rates of getting drunk and using marijuana, Ritalin/Adderall, and cocaine were notably higher than national norms. Results also indicated that containment in high school relates to substance use in college, possibly as a function of its effect on use in Grade 12. Further, analyses showed that participants in this study tended to use substances at a relatively similar rate as they did in Grade 12, emphasizing the importance of early maladaptive behavior. Taken together, these results reiterate and extend existing findings on affluent youth (Luthar & Barkin, 2012), who have now been shown to continue risky substance use behaviors throughout all four years of college. Despite the limitations noted above, this study highlights both

the urgency of future work on this subpopulation and effective, preventive substance use interventions.

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APPENDIX A
TABLES

Table 1

Grade 12: Past-Year Substance Use in the NESSY-2 Cohort vs. MTF Norms

	NESSY-2, Grade 12 (Age 18)					MTF 2010 (Grade 12)	
	Females (n: 122-123)		Males (n: 143-146)			Females	Males
	<u>%</u>	<u>Ratio:</u> <u>MTF</u>	<u>%</u>	<u>Ratio:</u> <u>MTF</u>	<u>%</u>	<u>%</u>	
Drunk	71.54	1.75	69.86	1.49	40.8	46.8	
Marijuana	39.02	1.27	58.22	1.52	30.7	38.3	
Ritalin/Adderall	7.38	1.34	7.53	1.00	5.5	7.5	
Downers	1.63	0.31	9.66	1.64	5.2	5.9	
Inhalants	0.81	0.32	1.37	0.29	2.5	4.7	
Heroin	-	-	-	-	0.5	1.1	
Hallucinogen	0.00	0.00	8.22	1.04	2.9	7.9	
Ecstasy/Ketamine	0.81	0.23	2.10	0.40	3.6	5.3	
Amphetamines	0.00	0.00	2.74	0.33	6.4	8.3	
Alcohol	84.55	1.29	80.14	1.23	65.3	65.0	
Cigarettes	21.95	-	27.40	-	-	-	
Steroids	0.00	0.00	1.37	0.55	0.3	2.5	

a) Johnston et al., 2011; b) Dashes indicate that the item was not asked; c) Comparisons for which MTF features multiple substances, the ratios are based on the MTF substance with the highest rate; Adderall > Ritalin; Tranquilizer > Barbiturate; Ecstasy > Ketamine; d) Rit. = Ritalin; Bar. = Barbiturate; Tran. = Tranquilizer

Table 2

College Freshmen: Past-Year Substance Use in the NESSY-2 Cohort vs. MTF Norms

Substance	NESSY-2, Freshmen (Age 19)				MTF 2011, College (Ages 19-22)	
	F (n: 74-77)		M (n: 57-58)		F	M
	%	Ratio: MTF	%	Ratio: MTF	%	%
Drunk	84.00	1.45	81.03	1.28	58.1	63.4
Marijuana	53.25	1.84	56.90	1.43	29.0	39.9
Ritalin/Adderall	16.88	2.19	27.59	2.09	7.7	13.2
Cocaine/Crack	3.95	1.52	12.07	2.68	2.6	4.5
Downers	2.60	0.68	8.62	1.76	3.8	4.9
Inhalants	1.35	1.93	5.17	4.70	0.7	1.1
Heroin	0.00	0.00	1.72	17.20	0.1	0.1
Hallucinogen	2.60	1.37	3.51	0.47	1.9	7.5
Ecstasy/Ketamine	2.60	0.68	5.17	1.10	3.8	4.7
Amphetamines	0.00	0.00	1.72	0.15	8.2	11.1
Alcohol	93.42	1.20	91.23	1.20	78.1	76.2
Cigarettes	19.74	0.84	39.66	1.34	23.4	29.5
Steroids	0.00	0.00	1.72	2.46	0.0	0.7

a) Johnston et al., 2014; b) Comparisons for which MTF features multiple substances, the ratios are based on the MTF substance with the highest rate; Adderall > Ritalin; Tranquilizer > Barbiturate; Ecstasy > Ketamine; c) Rit. = Ritalin; Bar. = Barbiturate; Tran. = Tranquilizer

Table 3

College Sophomores: Past-Year Substance Use in the NESSY-2 Cohort vs. MTF Norms

<u>Substance</u>	NESSY-2, Sophomores (Age 20)				MTF 2012, College (Ages 19-22)	
	F (n: 77-78)		M (n: 71-72)		F	M
	<u>%</u>	<u>Ratio:</u> <u>MTF</u>	<u>%</u>	<u>Ratio:</u> <u>MTF</u>	<u>%</u>	<u>%</u>
Drunk	93.51	1.50	76.39	1.28	62.5	59.9
Marijuana	61.04	1.91	58.33	1.50	32.0	39.0
Ritalin/Adderall	16.88	2.22	30.56	2.75	7.6	11.1
Cocaine/Crack	6.41	2.37	18.06	4.88	2.7	3.7
Downers	3.85	1.24	9.72	2.49	3.1	3.9
Inhalants	1.28	1.28	0.00	0.00	1.0	2.3
Heroin	0.00	0.00	1.39	6.95	0.1	0.2
Hallucinogen	1.28	0.37	7.04	1.17	3.5	6.0
Ecstasy/Ketamine	5.13	0.92	18.06	3.01	5.6	6.0
Amphetamines	2.56	0.25	5.56	0.44	10.1	12.6
Alcohol	94.81	1.18	87.50	1.13	80.3	77.5
Cigarettes	25.64	1.20	37.50	1.43	21.3	26.3
Steroids	1.28	2.56	1.39	-	0.5	-

a) Johnston et al., 2014; b) Comparisons for which MTF features multiple substances, the ratios are based on the MTF substance with the highest rate; Adderall > Ritalin; Tranquilizer > Barbiturate; Ecstasy > Ketamine; c) Rit. = Ritalin; Bar. = Barbiturate; Tran. = Tranquilizer

Table 4

College Juniors: Past-Year Substance Use in the NESSY-2 Cohort vs. MTF Norms

Substance	NESSY-2, College Juniors (Age 21)				MTF 2013, College (Ages 19-22)	
	F (n: 82-84)		M (n: 74-76)		F	M
	%	Ratio: MTF	%	Ratio: MTF	%	%
Drunk	91.57	1.62	78.95	1.31	56.4	60.3
Marijuana	58.33	1.79	53.95	1.35	32.6	40.1
Ritalin/Adderall	21.69	2.44	28.38	2.13	8.9	13.3
Cocaine/Crack	9.52	5.29	13.16	3.13	1.8	4.2
Downers	5.95	1.65	11.84	2.04	3.6	5.8
Inhalants	1.20	2.40	2.63	5.26	0.5	0.5
Heroin	0.00	0.00	0.00	0.00	0.1	0.5
Hallucinogen	1.19	0.44	6.58	0.90	2.7	7.3
Ecstasy/Ketamine	10.71	2.75	18.42	2.46	3.9	7.5
Amphetamines	2.38	0.25	6.58	0.53	9.4	12.4
Alcohol	98.80	1.33	84.21	1.08	74.2	77.7
Cigarettes	23.81	1.15	40.79	1.51	20.7	27.1
Steroids	0.00	-	0.00	0.00	-	1.8

a) Johnston et al., 2014; b) Comparisons for which MTF features multiple substances, the ratios are based on the MTF substance with the highest rate; Adderall > Ritalin; Tranquilizer > Barbiturate; Ecstasy > Ketamine; c) Rit. = Ritalin; Bar. = Barbiturate; Tran. = Tranquilizer

Table 5

College Seniors: Past-Year Substance Use in the NESSY-2 Cohort vs. MTF Norms

Substance	NESSY-2, College Seniors (Age 22)				MTF 2014, College (Ages 19-22)	
	F (n: 77-78)		M (n: 72-73)		F	M
	%	Ratio: MTF	%	Ratio: MTF	%	%
Drunk	87.01	1.42	78.08	1.31	61.2	59.4
Marijuana	32.05	0.99	51.39	1.38	32.3	37.3
Ritalin/Adderall	19.23	2.24	24.66	2.22	8.6	11.1
Cocaine/Crack	7.69	2.14	10.96	1.96	3.6	5.6
Downers	3.85	1.24	16.44	4.01	3.1	4.1
Inhalants	0.00	0.00	2.78	1.99	1.2	1.4
Heroin	1.28	-	4.17	41.70	-	0.1
Hallucinogen	0.00	0.00	5.56	0.91	2.5	6.1
Ecstasy/Ketamine	5.13	1.19	5.56	0.94	4.3	5.9
Amphetamines	1.30	0.15	5.48	0.46	8.8	12.0
Alcohol	92.31	1.21	89.04	1.17	76.2	75.9
Cigarettes	15.38	0.72	32.88	1.34	21.3	24.5
Steroids	0.00	0.00	2.74	2.74	0.2	1.0

a) Johnston et al., 2014; b) Comparisons for which MTF features multiple substances, the ratios are based on the MTF substance with the highest rate; Adderall > Ritalin; Tranquilizer > Barbiturate; Ecstasy > Ketamine; c) Rit. = Ritalin; Bar. = Barbiturate; Tran. = Tranquilizer

Table 6

Summary of Linear Regression Analyses for Variables Predicting College Seniors' Substance Use: Drunk and Marijuana Use

Variable	Been Drunk – College: Senior Year						Marijuana Use – College: Senior Year					
	Model 1			Model 2			Model 1			Model 2		
	<i>B</i>	<i>SE</i> <i>B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Grade 12 Substance Use	----	----	----	0.47***	0.08	0.49***	----	----	----	0.39***	0.07	0.45***
Gender	0.24	0.32	0.07	0.12	0.28	0.03	1.17***	0.30	0.32***	-0.69*	0.29	-0.19*
Parental awareness	0.15	0.04	0.04	0.04	0.04	0.10	0.01	0.04	0.03	0.04	0.04	0.10
Containment – drugs	- 0.09*	0.04	-0.23*	-0.02	0.04	-0.04	-0.12**	0.04	-0.29**	-0.06	0.03	-0.15
<i>R</i> ²		.06			.26***			.18***			.34***	

* $p < .05$, ** $p < .01$, *** $p < .001$; Gender was coded 0 = female, 1 = male; *B* = Unstandardized regression coefficient; *SE B* = Standard error of the unstandardized regression coefficient; β = Standardized regression coefficient; Model 1 does not control for Grade 12 substance use, Model 2 does control for Grade 12 substance use

APPENDIX B
FIGURES

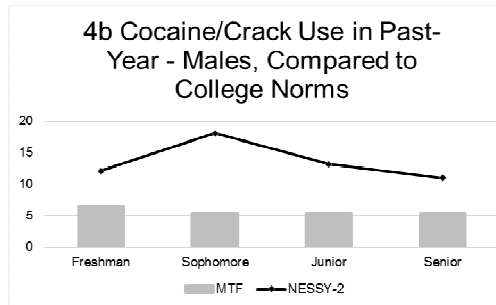
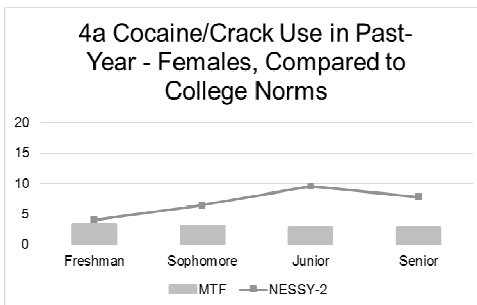
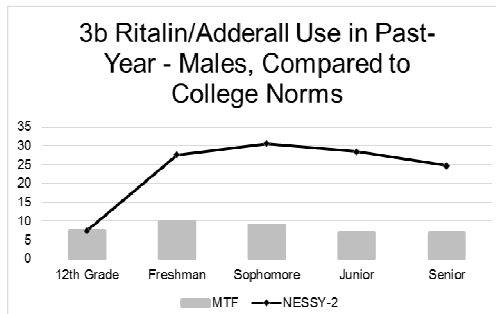
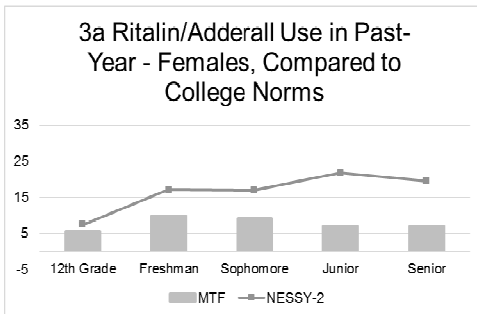
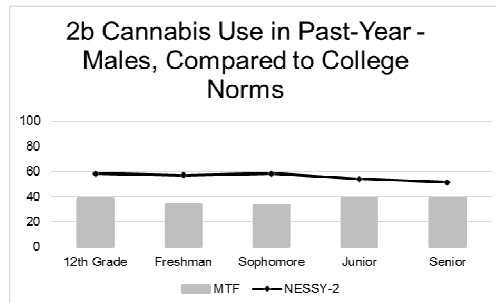
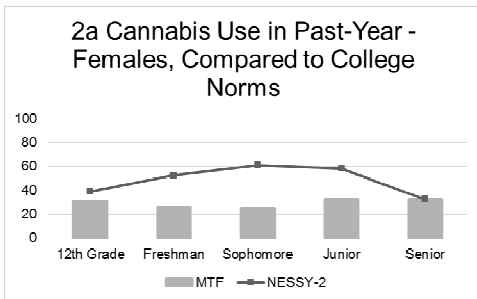
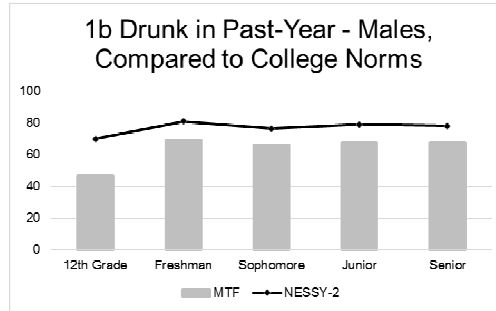
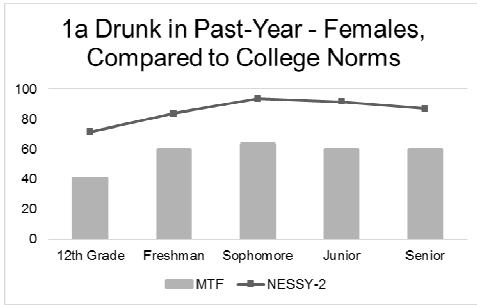
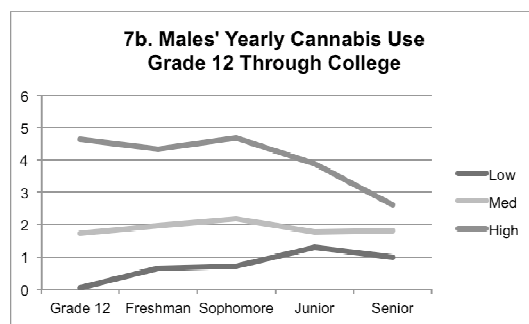
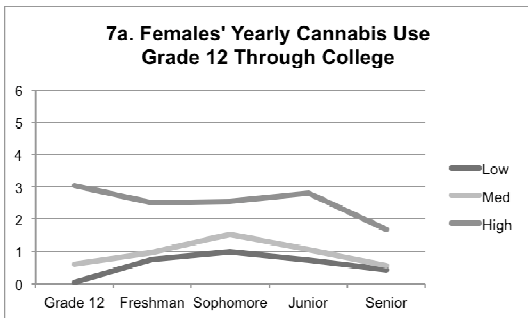
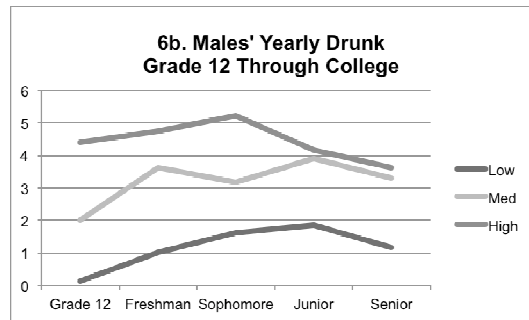
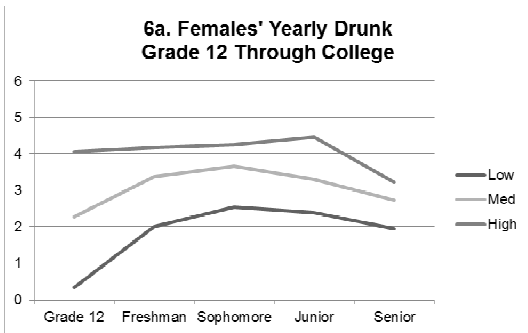
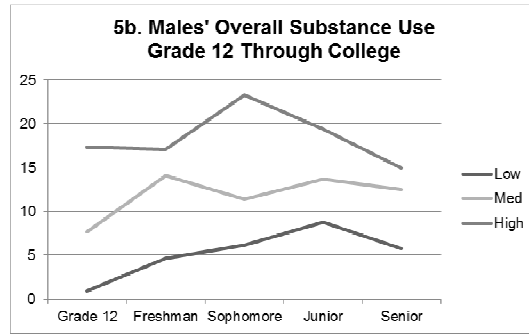
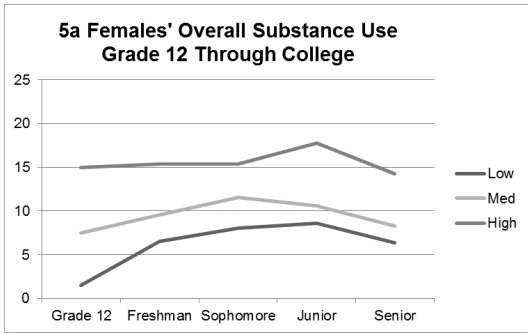


Figure 1a-4b: Yearly substance use for females and males, shown compared to college norms.



Figures 5a-7b: Yearly substance use for females and males over time, based on Grade 12 use groups (low, medium, and high).

Note 6a,b & 7a,b: 0=never; 1=1-2 times; 2=3-5 times; 3=6-9 times; 4=10-19 times; 5=20-39 times; 6=40+ times

APPENDIX C
MEAN SCORES AND ATTRITION COMPARISONS

Table A1

Means (SD) of Grade 12 Scores and Comparisons for Study Completers and Non-completers

12 th Grade Predictors	Senior-Year		<i>d</i>	<i>F</i>	<i>p</i>
	Senior-Year Completers (n=124) Mean (SD)	Non- Completers (n=142) Mean (SD)			
Past-year Sub. Use	8.00 (6.13)	8.70 (7.85)	-0.10	7.83	0.01
Been Drunk	2.16 (1.86)	2.24 (2.07)	-0.04	3.50	0.06
Marijuana Use	1.48 (2.09)	1.80 (2.19)	-0.15	0.62	0.43
Containment-Drugs	12.30 (4.34)	11.53 (4.62)	0.17	1.69	0.19
Parental Awareness	23.42 (4.07)	23.13 (3.92)	0.07	0.27	0.61

APPENDIX D
IRB APPROVAL DOCUMENT



APPROVAL: CONTINUATION

Suniya Luthar
Psychology

Suniya.Luthar@asu.edu

Dear Suniya Luthar:

On 9/18/2015 the ASU IRB reviewed the following protocol:

Type of Review:	Continuing Review
Title:	Substance abuse among suburban adolescence: A prospective study
Investigator:	Suniya Luthar
IRB ID:	STUDY00001862
Category of review:	
Funding:	Name: Arizona State University, Funding Source ID: Provost's Office
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Initial recruitment letter 9-1-15.pdf, Category: Recruitment Materials; • ASU IRB Consent Form for Online Measures 9-1-15, Category: Consent Form; • Consent Form_Academic Indices.pdf, Category: Consent Form;

The IRB approved the protocol from 9/18/2015 to 9/17/2016 inclusive. Three weeks before 9/17/2016 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 9/17/2016 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Phillip Small
Emma Lauer
Lucia Ciciolla
Alexandria Curlee

Phillip Small
Shannon Rhoads