

Disentangling the Contexts of Adolescent Substance Use: An Examination of Gender Differences

Sampson Lee Blair^{1,*} and Sha Luo²

¹The State University of New York, Buffalo, USA

²The University of Wisconsin, USA

Abstract: Previous studies of adolescent substance use have noted how adolescent substance use is influenced by both protective and risk factors. Additionally, researchers have also noted the gradual convergence of female and male substance use, resulting in similar substance use patterns across the two. Using data from a nationally representative sample of high school seniors, this study examines the distinct effects of contextual factors upon the substance use by adolescent females and males. While both girls and boys do report similar patterns of substance use, the analyses demonstrate that peer, family, school, and work contexts affect females' and males' substance use in different manners. While peers readily affect drinking behaviors of each sex, peer influence yields significant associations with females' vaping, but not males'. Among males, family contextual factors are associated with both vaping and marijuana use, while females' vaping and marijuana use are more substantially affected by school and work contexts. The findings of this study, along with the implications thereof, are framed within the ecodevelopmental perspective.

Keywords: Adolescence, Alcohol, Marijuana, Peer Pressure, School, Vaping.

INTRODUCTION

Across the adolescent years, youth undergo a wide variety of maturational changes, wherein their physical maturation leaves them looking increasingly more like adults, yet it is also a time when their emotional and cognitive maturation may leave them unready to take on adult roles and behaviors, along with the associated consequences. Adolescence is also a time of substantial change in the social contexts of youth, as parental influence begins to wane, while peer influence grows more impactful (Prins *et al.*, 2021). By mid-adolescence, youth find themselves spending more time in school, with time in classes becoming supplemented by time spent in a variety of after-school activities, such as sports and clubs (Ladis *et al.*, 2021). Beyond these contexts, adolescents commonly take on paid employment, which requires their commitment of time and effort, but which also provides them with income, along with sustained contact with co-workers, customers, and the work environment (Blair and Dong, 2021). Within and across these various contexts, adolescence is also a time when youth partake of opportunities to engage in risk-taking behaviors, with substance use being of primary concern (Johnston *et al.*, 2019).

While substance use by adolescents is prohibited by law, teens frequently engage in the same, with drinking alcohol, smoking (of both traditional and electronic cigarettes), and marijuana use being among

the most frequently used (Kreski *et al.*, 2022). The drinking of alcohol is quite common among adolescents, with approximately 35% of high school students reporting that they do so on a regular basis (Kann *et al.*, 2014), and they reach a level of intoxication which leaves them feeling "drunk" approximately 2.5 times each month (Yurasek *et al.*, 2019). Alcohol consumption often begins in the early adolescent years, but reaches its peak in late adolescence (16 to 19 years of age) (Hutchinson *et al.*, 2020). Binge drinking (the consumption of multiple drinks in a short period of time) is common, with boys being more likely than girls to engage in it (Longmore *et al.*, 2022). Alcohol is typically the first substance used by adolescents, with the smoking of cigarettes coming, thereafter (Johnston *et al.*, 2019). In preceding decades, it was estimated that almost 3,200 adolescents tried their first cigarette, each day (Kandel *et al.*, 2004), but the smoking of traditional cigarettes has declined over that span, while the use of electronic cigarettes (vaping) has increased, with almost one-fourth of all older adolescents doing so on a regular basis (Meich *et al.*, 2019). Females are more likely to smoke, as compared to males (Blair and Dong, 2021; Johnston *et al.*, 2019), with smoking often regarded as a means to reduce stress and anxiety (Richardson *et al.*, 2011), as well as to gain peer acceptance and approval (Tomek *et al.*, 1999). Although rates of substance use, overall, have been declining, marijuana use among adolescents has been increasing (Meich *et al.*, 2019). Marijuana is the second most commonly used substance among adolescents and, unlike alcohol, appears to be equally prominent among both

*Address correspondence to this author at The State University of New York, Buffalo, USA; E-mail: slblair@buffalo.edu

girls and boys, with over one-third of high school students reporting its use (Beverly *et al.*, 2019).

Despite the seemingly widespread use of substances during adolescence, such usage is not without deleterious consequences. Substance use of all varieties have long been associated with substance use disorders and addiction, later in life (Ladis *et al.*, 2021). Poor school performance (Waddell *et al.*, 2022), along with lower cognitive functioning (Scott *et al.*, 2018), has also been linked to substance used during the adolescent years. Substance use has similarly been shown to be linked with higher rates of juvenile delinquency (Bright *et al.*, 2017), as well as risky sexual behaviors (Chen and Jacobson, 2012). Suicidal thoughts, as well as attempts at suicide, have similarly been associated with various forms of substance use during the adolescent years (Poorolajal *et al.*, 2015). This study will seek to better understand how the various social contexts of adolescents influence the use of substances (Meldrum *et al.*, 2023). Furthermore, given that previous studies have noted the distinct patterns of substance use by adolescent females and males (Johnston *et al.*, 2019), as well as the different influence of contextual factors upon their patterns of substance use (Rusby *et al.*, 2018; Zimmerman and Farrell, 2017), this study will examine the relative influence of family, peer, school, and work contexts upon the substance use of adolescent girls and boys.

UNDERSTANDING THE CONTEXTUAL NATURE OF SUBSTANCE USE

While a wide range of theoretical explanations exist concerning adolescents' use of different substances, the various theories do agree upon one common point – the behavioral patterns of adolescents are affected by a variety of interwoven environmental contexts, each of which can potentially provide both risk factors and protective factors which may increase or decrease the substance use patterns of adolescents. Adolescent peer influence has often been framed with differential association theory (Sutherland, 1947), maintaining that teens are likely to replicate the behaviors of peers, particularly as adolescents tend to select friends who are similar to themselves and of whose behaviors they approve (Laursen, 2017). Binge drinking during adolescence, for example, has been linked to the binge drinking of close friends (Kuntsche *et al.*, 2017). From the perspective of social learning theory (Akers, 1985), interactions with peers can either encourage or discourage substance use, depending upon the nature of the social context in which those interactions occur.

There is general consensus that peers can readily affect the usage patterns of substances by adolescents, including alcohol (Prins *et al.*, 2021), smoking (Alexander *et al.*, 2001; Cambron *et al.*, 2018), and marijuana (Beverly *et al.*, 2019). It is necessary to note, though, that the impact of interactions with others can vary depending upon the social context, as well as by the gender of the adolescents. The relative effect of peers, parents, or others upon adolescent girls is likely to be distinct from the effect upon boys (Rusby *et al.*, 2018). Social control theory posits that youth will constantly be tempted to engage in deviant acts (including substance use), yet will refrain from such temptations in accordance with the bond elements, including attachment, involvement, commitment, and belief (Hirschi, 1969). These elements have been demonstrated to be quite influential, and strong emotional bonds to parents, after-school employment, and participation in school clubs or sports all appear to lessen the likelihood that adolescents will engage in substance use (Meldrum *et al.*, 2023).

Bronfenbrenner's (1979) ecological systems theory stipulates that adolescent development is affected by entities within the different layers of their social environment. Ecodevelopmental theory (Overton, 2010) takes this perspective further, by asserting that adolescent development is shaped by the surrounding environment, and adolescents can, in turn, affect those same environments. Adolescents' development is envisioned as occurring across multiple contexts, including the family, peers, school, and work. Furthermore, ecodevelopmental theory stipulates that each of these contexts can influence adolescent behavior, in both individual and combined manners. Central to this view is the recognition that each context has the potential for both positive and negative influence (Booth *et al.*, 2021), and these effects can operate independent of one another and in combination (Blair and Dong, 2021). Researchers have called for greater study of how the various contextual factors may influence substance use among adolescents (Zimmerman and Farrell, 2017).

GENDER, SOCIAL CONTEXTS, AND SUBSTANCE USE

Although a wide array of substances may appeal to adolescents, drinking alcohol and smoking tend to be the first usages, with marijuana use following, thereafter (Bright *et al.*, 2017). Gender differences abound in regard to adolescent substance use, wherein girls tend to have higher rates of drinking during early

adolescence (Chen and Jacobson, 2012), with boys' drinking rates surpassing those of girls by mid-adolescence (Miech *et al.*, 2015). Researchers have suggested that girls may regard drinking as unfeminine, and thus be subjected to negative stigmatization by their peers, while drinking behaviors among boys may be viewed as more masculine (Shippee and Owens, 2011). Smoking behaviors have a similar gendered divide, with females being more likely to both smoke traditional cigarettes and vape (Johnston *et al.*, 2019). Researchers have noted that girls often smoke as a means of reducing stress, coping with lower levels of self-efficacy, and even as a means of losing weight (due to concerns about body image) (Blair and Dong, 2021). Interestingly, marijuana usage rates among adolescents have increased somewhat over recent years, with adolescent girls being shown to have slightly higher usage rates than boys (Bhatia *et al.*, 2023). Although peer influence certainly affects the likelihood of marijuana use during adolescence, the strength of peer pressure to use marijuana has been found to be greater among adolescent males (Farrell *et al.*, 2017), with prevailing expectations of masculinity within male peers groups being noted as a predictive factor in some studies (Merrin *et al.*, 2022).

A considerable body of research has addressed the context of the family, and how it may affect patterns of adolescent substance use (Meldrum *et al.*, 2023). Parent-adolescent relationships are a central factor within the familial context, and parental monitoring (maintaining knowledge about an adolescents' activities and peers) has repeatedly been shown to reduce overall rates of substance use, as well as delay the age of first experimentation of substances (Leadbeater *et al.*, 2022). The overall quality of the relationship between parents and adolescents has similarly been linked with substance use patterns (Van Ryzin *et al.*, 2012). Relationships with parents represent a major protective factor in terms of adolescent substance use (Mason *et al.*, 2016), as a warm and supportive parent-adolescent relationship can enhance trust and also make parental monitoring and supervision easier (Mun *et al.*, 2018). The nature of the parent-adolescent relationship does not occur within a vacuum, though, and is potentially affected by other family attributes. Lower parental educational attainment has been associated with higher rates of adolescent substance use (Bachman *et al.*, 2011). With higher levels parental education, knowledge about substance use risks may be greater (Andrabi *et al.*, 2017), and family income may be higher, which has also been demonstrated to be a protective factor

against adolescent substance use (Grevenstein *et al.*, 2020). Even family structure may affect the impact of parents upon adolescent substance use, as elements such as the number of parents or number of siblings may affect parents' effectiveness in monitoring the behaviors of their daughters and sons (Hoffman, 2017). While a positive parent-adolescent relationship and parental monitoring can be effective in reducing adolescent substance usage, some researchers have posited that boys appear to be more readily affected by parental monitoring, as compared to girls (Andrade *et al.*, 2021; Crouter *et al.*, 1990).

Peers and parents are often viewed in juxtaposition during the adolescent years, as the growing desire for autonomy, identity formation, and independence frequently leads adolescents to create a separation between themselves and parents, while forging closer bonds with friends (Mak *et al.*, 2020). A wide variety of risk-taking behaviors have been linked to the desire to conform to peers' expectations, and to replicate their behaviors (Grigsby *et al.*, 2017). Within adolescent peer groups, conformity is often the easiest path, which often leads adolescent into early experimentation with substances, as well as developing specific patterns of usage (Mason *et al.*, 2016). Having friends during adolescence who use substances has been linked to the higher rates of consumption of alcohol (Akers, 2009), smoking (Kobus, 2003), and marijuana (Fagan *et al.*, 2013). In the lives of adolescents, peers can represent role models, whom they may wish to imitate, but peers may also provide a reference point concerning perceptions of substance use, along with the potential for harm from such usage (Leban and Griffin, 2020). Hence, peers can function as both protective factors in the lives of adolescents, in a manner akin to that of parents, but can also function as a substantial risk factor (Merrin *et al.*, 2022), yet these difference forms of influence may vary between females and males. Peer disapproval of substance use, for example, has been shown to be particularly influential among females (Mason *et al.*, 2016). Studies have suggested that peer pressures to conform to prevailing gender norms are stronger among adolescent males (Galambos, 2004). However, previous research has also demonstrated that adolescent girls' substance use, such as with smoking, is often driven by the desire to obtain peer approval (Richardson *et al.*, 2011). Oddly, smoking (tobacco) is often regarded as acceptable and consistent with feminine standards by adolescent girls, while the use of marijuana is not (Warner *et al.*, 1999). Among adolescent boys, though, marijuana use is generally

accepted as appropriate (Farrell *et al.*, 2017). Within the context of peers, gendered norms and expectations regarding substance use are clearly complicated, dynamic, and can be quite influential (Dong and Blair, 2021).

Researchers have consistently noted that the school context typically serves as a strong protective factor in regard to adolescent substance use (Lee *et al.*, 2021). For adolescents, having a strong connection with their school has been associated with lower rates of substance use, delinquency, and overall risk-taking (Hsieh *et al.*, 2023). Participation in high school clubs, band, sports, and other organized activities places adolescents in a context which is typically adult-monitored and focused upon constructive and educational experiences, a context which lends itself to reducing the likelihood of engaging in risk-taking behaviors, such as substance use (Badura *et al.*, 2021). Within the school context, peer associations are framed within an environment which tends to be a protective factor (Lee *et al.*, 2021), and thus may reinforce positive peer influence. The engagement of adolescents in school itself, above and beyond school activities, is an important protective factor. School connectedness involves a variety of qualities, including students' perceptions of the school environment, having emotional bonds with teachers and classmates, and being dedicated to performing well in school (Bond *et al.*, 2007). Conversely, a low level of school performance has been associated with higher rates of adolescent substance use (Grevenstein *et al.*, 2020). However, research has shown that school attachment and a commitment to performing well yields a stronger protection against substance use among adolescent females, as compared to adolescent males (Daigle *et al.*, 2007). School connectedness among girls may decline over time, while boys' school connectedness and engagement may actually increase slightly (Simons-Morton and Chen, 2009), with both of these contextual changes having implications for adolescent substance use.

Employment is also a core context during adolescence, as the official employment rate of 35% (for teens between 16 and 19 years of age)(U.S. Bureau of Labor Statistics, 2019) is likely an underestimation, as many adolescents are employed in jobs which never appear on official government records (e.g., babysitting, yard work). Estimates of youth employment range above 80%, as the majority of high school students holding paid jobs before they graduate (Mortimer, 2005). Given their relatively low levels of job

skills and experience, approximately three-fourths of working teens are employed in either the "food service," "service," or "sales and office" sectors of the labor force (U.S. Bureau of Labor Statistics, 2019), with over a third of working adolescents doing their jobs over 20 hours per week (McLoyd and Hallman, 2020). Adolescents females have a slightly higher rate of employment, as compared to males, but tend to earn significantly less, and report higher levels of work-related stress, as compared to males (Besen-Cassino, 2018). A common concern for both employed girls and boys, though, are the higher rates of substance use which are associated with teen employment (Blair and Dong, 2021). Long work hours have been associated with deleterious outcomes for working adolescents (McLoyd and Hallman, 2020), as have relationships with co-workers, who may encourage experimentation and/or higher rates of substance use (Hwang and Domina, 2016). The money earned from employment can potentially be used for the purchase of substances, if so desired, and can also represent an additional form of independence from parental monitoring (Blair and Dong, 2021). For adolescents, the work context may complicate their lives in other manners, as parents often regard paid employment as being harmful to their daughters' and sons' school performance (Staff *et al.*, 2019).

Ecodevelopmental theory recognizes that the family, peer, school, and work contexts can influence adolescent substance use, in both individual and combined manners. From this perspective, attributes of each context can contribute either protective or risk factors, thus either increasing or decreasing adolescent substance usage, and these protective or risk factors can vary by gender. In order to more fully assess how each context, along with the individual attributes of each, may affect adolescent substance use, analyses of a nationally representative sample of high school students will now be performed.

DATA AND METHODS

The present study makes use of data from the 2021 wave of the Monitoring the Future survey (Monitoring the Future: A Continuing Study of American Youth). From its beginnings in 1975, The Monitoring the Future study was created with the specific purpose of examining patterns of substance use among American adolescents. Conducted annually, the survey assesses a range of behaviors and attitudes of adolescents, as well as characteristics of their families and daily activities, in addition to its focus upon substance use.

The young participants are assured of the confidentiality of their answers, which are completely anonymized, thus making their answers more likely reliable. The sample is a nationally representative sample of high school seniors, taken from approximately 130 public and private high schools throughout the United States. Following the removal of cases due to missing or incomplete response, the resulting sample is comprised of 632 females and 564 males, all of whom are in their final year of high school and whom are between 17 to 19 years of age.

Although contemporary adolescents can potentially use a wide variety of illegal and/or illicit substances, this study focuses upon three of the more commonly used types – alcohol, vaping (electronic cigarettes), and marijuana. In regard to alcohol use, adolescents were asked how often they had drunk alcohol over the past 30 days. Responses ranged from: 1) “0 occasions,” 2) “1-2 occasions,” 3) “3-5 occasions,” 4) “6-9 occasions,” 5) “10-19 occasions,” 6) “20-39 occasions,” to 7) “40 or more occasions.” In regard to vaping (electronic cigarettes), respondents were asked how often they have vaped over the past 30 days, with responses ranging from: “0 days,” “1-2 days,” “3-5 days,” “6-9 days,” “10-19 days,” to “20 days or more.” Respondents were also queried concerning their use of marijuana (i.e., how often they had used it over the past 30 days). Marijuana use was measured with the same scale as the measure of alcohol use. By using the measures of alcohol, vaping, and marijuana usage, the analyses should assess the most commonly used substances, on the part of adolescents.

Including among the primary contexts which may potentially influence adolescents’ usage of various substances are peers, the family, school, and work. As previously explained, peers represent important role models in the lives of adolescents, and particularly so in terms of substance use. As such, adolescents were asked, in separate questions, how many of their friends drink alcohol or use marijuana. Responses to these items ranged from “none” to “all,” across a five-point scale. Of course, the potential for peer influence is directly associated with peer contact, so respondents were also asked how often they get together with friends, with responses ranging from “never” to “daily,” across a six-point scale. Respondents were also queried about various attributes of their families. Parental educational attainment could serve as both an aspirational model for adolescents, as well as a proxy for social class standing of the family. In terms of parental educational attainment, the highest level of

parental educational attainment was coded as: 1=grade school, 2=some high school, 3=high school degree, 4=some college, 5=college degree, to 6=graduate degree. Respondents were also asked how many siblings they had. Finally, the nature of the parent-adolescent relationship was assessed with a question which asked how often respondents had argued or fought with their parents, over the past year. Responses to this item ranged from “not at all” to “5 or more times,” over a five-point scale.

School also represents a central context in the lives of adolescents. In order to measure involvement in school activities, particularly those involving same-aged peers, respondents were asked about their level of involvement in various school activities. These activities included: a) the school newspaper or yearbook, b) music or other performing arts, c) athletic teams, and d) other school clubs or activities. When asked about their involvement in these activities, responses ranged from “not at all” (1) to “a great extent” (5). As previously explained, school performance has been shown to be associated with substance use. In regard to grade performance in high school, respondents were asked to describe their average grade so far (coded with a range of 1=D through 9=A). Respondents were also asked how many days, over the previous four weeks, they had skipped school. Responses to this item ranged from “none” (1), “one” (2), “two” (3), “three” (4), “four or five” (5), “six to ten” (6), to “eleven or more” (7). As previously noted, many adolescents also spend considerable time in paid employment, which thus represents yet another important context in their lives. Given that employment during the adolescent years is relatively common, and has been associated with substance use, respondents were asked how many hours, each week, they were employed. Responses to this item ranged from: 1) 5 hours or less, 2) 6 to 10 hours, 3) 11 to 15 hours, 4) 16 to 20 hours, 5) 21 to 25 hours, 6) 26 to 30 hours, 7) 31 to 35 hours, to 8) 36 hours or more. Respondents were also asked about how much they earn, on a weekly basis. Responses to their query ranged from: 1) \$0, 2) \$1-5, 3) \$6-10, 4) \$11-20, 5) \$21-35, 6) \$36-50, 7) \$51-75, 8) \$76-125, 9) \$126-175, to 10) \$176 or more. Finally, adolescents were asked how often they had gotten into a “serious fight” at work, over the past year. Responses to this item “not at all” to “five or more times,” over a five-point scale. The associations between the peer, family, school, and work contexts, as they potentially influence adolescent substance use, will now be examined.

RESULTS

Table 1 presents the mean levels of alcohol, vaping, and marijuana use among high school seniors. As shown, females and males reported virtually identical patterns of alcohol use, with 29.% stating that they had drunk alcohol in the past 30 days. The specific usage patterns are also quite similar. Among those who reported drinking alcohol, slightly more than half stated

that they had only drunk alcohol on 1 or 2 occasions. While the total amounts of alcohol cannot be assessed with these data, the drinking behaviors can, nonetheless, shed substantial light upon alcohol consumption by adolescents. With many adolescents reporting that they had drunk on 3 or more occasions, it is reasonable to assume that each occasion involved the consumption of more than one alcoholic beverage. These patterns may be additionally concerning, given

Table 1: Levels of Substance Use among Adolescents, by Sex

	Alcohol	
	Females	Males
Used in past 30 days	29.6%	29.6%
Rate of Usage		
Never	70.4%	70.4%
1-2 times	17.7	17.6
3-5 times	6.5	7.3
6-9 times	3.5	2.3
10-19 times	1.3	0.7
20-39 times	0.3	0.2
40+ times	0.3	1.6
	Vaping	
	Females	Males
Used in past 30 days	19.4	16.5%
Rate of Usage		
Never	81.6%	83.5%
1-2 days	5.2	3.4
3-5 days	1.7	2.3
6-9 days	2.2	2.7
10-19 days	1.9	2.7
20+ days	4.6	5.5
	Marijuana	
	Females	Males
Used in past 30 days	19.0%	20.2%
Rate of Usage		
Never	81.0%	79.8%
1-2 times	7.9	6.9
3-5 times	2.7	3.2
6-9 times	3.2	1.1
10-19 times	2.2	2.5
20-39 times	1.1	4.1
40+ times	1.9	2.5
N	632	564

Note: Sample is limited to high school seniors, aged 17-19.

that numerous studies have shown that binge drinking is particularly common among adolescents who do drink.

While alcohol consumption is quite similar among females and males, it appears that vaping is slightly more prominent among adolescent girls. Approximately 19.4% of girls reported vaping over the past 30 days, as compared to 16.5% of boys. It is worth noting that, among those who vape, there is a tendency toward regular usage. Among females, one-third of those who vaped reported doing so on 10 or more days over the past month. This pattern of usage was also shown among males, with almost half of users reported having done on 10 or more days over the previous month. In regard to marijuana usage, females and males again reported very similar patterns of use, with about one-fifth of girls and boys stating that they had used marijuana. The usage patterns of females and males, however, were somewhat different. Among girls, approximately 16% reported using marijuana on more than 20 occasions over the past month, while among boys, almost 33% reported the same pattern of use. Hence, while females and males reported a similar rates of marijuana users, the consumption rate is substantially higher among males.

Table 2 presents the mean levels of contextual characteristics among adolescents, and provides pertinent traits which may affect substance use patterns. In regard to peer characteristics, both females and males reported that slightly better than half of their friends drank alcohol. However, males reported that significantly more of their friends used marijuana, as compared to the friends of females (2.75 versus 2.04, respectively). As previously stated, peers represent influential role models, and these patterns suggest that there are considerable differences in the modeled behaviors, at least in terms of marijuana use, between females and males. Females and males reported similar rates of going out, each week, with each spending almost 3 evenings out with peers.

In terms of family characteristics, the parents of both female and male respondents had several years of college education, on average. Additionally, both females and males reported having approximately 2 siblings, on average. Hence, the average family context contained relatively well-educated parents, and two siblings. However, female respondents reported significantly more fights or arguments with their parents, as compared to males (3.70 versus 2.99, respectively). This pattern is consistent with previously

Table 2: Mean Levels of Contextual Characteristics among Adolescents, by Sex

	Females		Males	
	Mean	SD	Mean	SD
Peers				
# of Friends who use:				
Alcohol (1-5)	2.83	0.83	2.85	0.80
Marijuana (1-5)	2.04***	0.67	2.75	0.71
# times Go Out/week (1-6)	2.68	1.33	2.80	1.39
Family				
Parental Education (1-6)	4.42	1.29	4.52	1.12
# Siblings (0-3)	2.01	0.96	1.92	0.98
# Fights w/parents (1-5)	3.70***	1.28	2.99	1.35
School				
# School activities (1-5)	2.13***	0.93	1.88	0.85
High school Grades (1-9)	7.18***	1.93	6.51	2.10
# times Skipped school (1-7)	1.55	1.15	1.52	1.20
Work				
# Hours/week working (1-8)	3.34	2.30	3.16	2.40
Earnings/week (1-10)	4.86	3.71	4.54	3.81
# Fights at work (1-5)	1.12**	0.52	1.19	0.65
N	632		564	

Note: Significance levels denote difference between means: *** $p < .01$, ** $p < .05$, * $p < .10$; Sample is limited to high school seniors, aged 17-19.

mentioned studies, which have shown higher levels of tension between parents and adolescent daughters, as compared to sons.

The school contexts were shown to be quite distinct between girls and boys, as well, with females reporting significantly more involvement in school activities (e.g., sports, clubs), as compared to males (2.13 versus 1.88, respectively). As anticipated, adolescent females also reported a higher grade average in school, as compared to males (71.8 versus 6.51, respectively). Females and males were similar, though, in terms of their propensity to skip school, with each reporting that they had skipped or “cut” school approximately two times, over the past month. Hence, females appear to be more engaged in school activities, and also to perform better in school, relative to adolescent males. Finally, in terms of paid employment, females and males reported a similar frequency of hours spent at work, each week, with each spending around 15 hours per week in a paid job. Females, though, report earning slightly more than their male counterparts, on average. This disparity may result from the distinct types of jobs

which females and males have during their teen years. Interestingly, males reported a higher frequency of having “serious fights” at work, as compared to females (1.19 versus 1.12, respectively). The manners by which these contextual factors may influence patterns of substance use will now be examined.

Table 3 presents the multivariate regression models of alcohol use among high school seniors. Given the prominent role of peers in the lives of adolescents, the models presented for each sex are first comprised of family, school, and work factors, with a second model including peer factors. Among females, the frequency of fights with their parents is shown to be significantly associated with alcohol use in Model 1 ($b = .115$), and the association is also significant in Model 2 ($b = .093$). Understandably, it is challenging to discern the causality of this association, as adolescent-parent tensions may precede alcohol use, but could also be a consequence, thereof. In Model 2, female alcohol use is shown to be significantly associated with both peer alcohol use ($b = .202$) and the frequency of going out ($b = .118$). Clearly, this may result from the substantial

Table 3: OLS Regression Models for Alcohol Use among Adolescents, by Sex

	Females		Males	
	Model 1	Model 2	Model 1	Model 2
Peers				
# of Friends who use:				
Alcohol		.202*** (.177)		.331*** (.251)
Marijuana		.024 (.017)		-.124 (-.083)
# times Go Out/week		.118*** (.166)		.134*** (.176)
Family				
Parental Education	.050 (.068)	.030 (.040)	.077* (.081)	.049 (.051)
# Siblings	-.055 (-.056)	-.062 (-.063)	-.044 (-.041)	-.038 (-.035)
# Fights w/parents	.115*** (.155)	.093*** (.126)	.079** (.100)	.032 (.041)
School				
# School activities	.061 (.060)	.023 (.022)	.082 (.066)	.018 (.015)
High school Grades	-.012 (-.024)	-.013 (-.026)	-.033 (-.065)	-.034 (-.067)
# times Skipped school	.057* (.069)	.032 (.039)	.076** (.086)	.065* (.073)
Work				
# Hours/week working	-.009 (-.022)	-.001 (-.003)	.042 (.094)	.036 (.082)
Earnings/week	.006 (.022)	-.004 (-.017)	.028* (.101)	.022 (.079)
# Fights at work	-.008 (-.004)	.013 (.007)	.094 (.058)	.109 (.067)
F	3.835	6.547	5.470	8.240
R-square	.053	.113	.082	.152
N	632		564	

Note: Standardized coefficients shown in parentheses; *** $p < .01$, ** $p < .05$, * $p < .10$; Sample is limited to high school seniors, aged 17-19.

role modeling effect which drinking peers represent. However, it is important to bear in mind that substance use in adolescence is likely to occur within a social setting (e.g., drinking with friends at a party). Among males, a similar pattern is evident, in that fights and arguments with parents is positively associated with drinking (b = .079). However, this association is not shown to be significant within Model 2. Thus, it appears that adolescent-parent tensions may not be as substantial among males, at least in terms of the impact upon drinking alcohol. Males' alcohol consumption is also positively associated with the consumption of alcohol by friends (b = .331) and with the number of times they go out each week (b = .134). Interestingly, males' drinking patterns are also associated with their frequency of skipping school (b = .076 and .065 in Models 1 and 2, respectively). Hence, while the alcohol usage by females and males do have similar predictive factors, particularly in regard to peers, it can be asserted that the family and school contexts yield distinct effects for each.

fights and arguments with parents is again shown to be positively associated with substance use (b = .135 and .102 in Models 1 and 2, respectively). School factors are also shown to yield salient effects upon females' vaping, as high school grades are shown to be negatively associated with vaping (b = -.085 and -.083 in Models 1 and 2, respectively). Hence, girls who perform better in school appear to be less likely to vape. However, skipping school is shown to be positively associated with vaping among females (b = .152 and .118 in Models 1 and 2, respectively). Paid employment also is shown to impact girls' vaping usage, as the number of hours working is shown to be positively associated with vaping (b = .091 and .098 in Models 1 and 2, respectively). In Model 2, peers' alcohol usage is significantly associated with girls' vaping (b = .170), as is the frequency of which females go out, each week (b = .183). Among females, all of the contexts have significant effects upon vaping, but school and peer factors appear to have the largest impacts.

Table 4 presents the multivariate regression models for vaping among high school seniors. Among females,

Among males, parental educational attainment was shown to be positively associated with vaping in both

Table 4: OLS Regression Models for Vaping among Adolescents, by Sex

	Females		Males	
	Model 1	Model 2	Model 1	Model 2
Peers				
# of Friends who use:				
Alcohol		.170* (.089)		.132 (.072)
Marijuana		.157 (.067)		.061 (.029)
# times Go Out/week		.183*** (.154)		.071 (.066)
Family				
Parental Education	.100* (.082)	.075 (.061)	.135** (.102)	.116** (.088)
# Siblings	.036 (.022)	.029 (.018)	.002 (.001)	-.002 (-.002)
# Fights w/parents	.135*** (.110)	.102** (.083)	.177*** (.162)	.144*** (.131)
School				
# School activities	.081 (.048)	.031 (.019)	-.057 (-.033)	-.086 (-.050)
High school Grades	-.085** (-.104)	-.083** (-.102)	-.109*** (-.154)	-.107*** (-.152)
# times Skipped school	.152*** (.112)	.118** (.086)	.052 (.042)	.047 (.038)
Work				
# Hours/week working	.091** (.134)	.098*** (.143)	.106*** (.171)	.107*** (.174)
Earnings/week	-.023 (-.054)	-.035 (-.082)	.031 (.034)	.007 (.019)
# Fights at work	.066 (.022)	.079 (.026)	.150 (.066)	.161* (.071)
F	4.739	6.106	9.605	7.950
R-square	.064	.106	.135	.148
N	632		564	

Note: Standardized coefficients shown in parentheses; *** p<.01, ** p<.05, * p<.10; Sample is limited to high school seniors, aged 17-19.

Models 1 and 2 ($b = .135$ and $.116$, respectively). In a manner similar to that shown among girls, boys' frequency of fights with their parents was also positively associated with vaping ($b = .177$ and $.144$ in Models 1 and 2, respectively). Within the context of school, grades were negatively associated with males' vaping ($b = -.109$ and $-.107$ in Models 1 and 2, respectively), yet no other school factors yielded a significant association. Adolescents males' employment hours were positively associated with vaping ($b = .106$ and $.107$ in Models 1 and 2, respectively). Within Model 2, having "serious fights" at work were also shown to be associated with male vaping, although to a lesser degree ($b = .161$). Interestingly, the results from Model 2 demonstrated no significant effects of peers upon males' vaping usage. This was quite distinct from the peer effects shown in the full model of girls' vaping usage, and again illustrates the unique patterns of contextual effects upon girls' and boys' substance use.

females, fights and arguments with parents yields a significant association ($b = .081$ in Model 1), yet this factor is no longer significant within the full model (Model 2). High school grades are again negatively associated with marijuana usage ($b = -.096$ and $-.091$ in Models 1 and 2, respectively). Skipping school, on the other hand, is shown to be positively associated with marijuana use ($b = .146$ and $.120$ in Models 1 and 2, respectively). Work hours also resulted in positive associations with females' marijuana use ($b = .081$ and $.079$ in Models 1 and 2, respectively). Interestingly, having "serious fights" at work resulted in a substantial association with girls' use of marijuana ($b = .273$ and $.246$ in Models 1 and 2, respectively). This effect is quite intriguing, as marijuana use is not typically associated with aggressive behavior, nor does fighting seem consistent with cultural norms regarding feminine behavior. Understandably, peer factors are quite impactful in regard to females' use of marijuana, as friends' marijuana use is positively associated with it ($b = .350$), as is females' frequency of going out each week ($b = .068$).

Table 5 presents the multivariate regression models for marijuana use among high school seniors. Among

Table 5: OLS Regression Models for Marijuana Use among Adolescents, by Sex

	Females		Males	
	Model 1	Model 2	Model 1	Model 2
Peers				
# of Friends who use:				
Alcohol		.055 (.037)		-.079 (-.043)
Marijuana		.350*** (.190)		.403*** (.194)
# times Go Out/week		.068* (.073)		.070 (.066)
Family				
Parental Education	.053 (.055)	.030 (.031)	.116** (.087)	.097* (.073)
# Siblings	.058 (.045)	.052 (.040)	.037 (.024)	.014 (.009)
# Fights w/parents	.081** (.084)	.048 (.049)	.137*** (.125)	.091** (.083)
School				
# School activities	-.021 (-.016)	-.034 (-.026)	-.120 (-.069)	-.128* (-.073)
High school Grades	-.096*** (-.149)	-.091*** (-.141)	-.093*** (-.131)	-.087*** (-.123)
# times Skipped school	.146*** (.136)	.120*** (.112)	.122** (.098)	.124** (.100)
Work				
# Hours/week working	.081*** (.150)	.079*** (.146)	.030 (.048)	.040 (.064)
Earnings/week	-.018 (-.054)	-.020 (-.061)	.031 (.080)	.020 (.051)
# Fights at work	.273*** (.115)	.246*** (.103)	.112 (.049)	.126 (.055)
F	7.984	9.249	6.731	6.746
R-square	.104	.152	.099	.128
N	632		564	

Note: Standardized coefficients shown in parentheses; *** $p < .01$, ** $p < .05$, * $p < .10$; Sample is limited to high school seniors, aged 17-19.

Among males, parental educational attainment is shown to be positively associated with marijuana use ($b = .116$ and $.097$ in Models 1 and 2, respectively). This association was not significant in the same models of girls' marijuana use. Fights and arguments with parents was also positively associated with marijuana usage among males ($b = .137$ and $.091$ in Models 1 and 2, respectively). School factors appeared to be particularly salient in regard to adolescent males' marijuana use. Boys' participation in school activities was negatively associated with marijuana use ($b = -.128$ in Model 2), and high school grade performance was also negatively associated with boys' marijuana usage ($b = -.093$ and $-.087$ in Models 1 and 2, respectively). However, skipping school resulted in a positive association with marijuana use among boys ($b = .122$ and $.124$). Interestingly, none of the work factors were shown to be significantly associated with boys' use of marijuana. However, friends' use of marijuana yielded a significant association with boys' marijuana usage ($b = .403$ in Model 2). As compared to the comparable models of girls' marijuana usage, boys seem to be more readily affected by school and family factors, while girls are influenced more by paid employment and peer factors. The meanings and implications of these findings will now be discussed.

CONCLUSIONS AND DISCUSSION

In the lives of contemporary adolescents, there is a wide variety of risk-taking opportunities, and substance use is most certainly one of the more common, as well as one of the more problematic opportunities. Across the years of adolescence, teens increasingly find themselves in situations where the consumption of alcohol, vaping, and marijuana use are within their reach, and they must choose whether to use them, or not. Over recent years, some forms of substance use by adolescents have been decreasing. The rates of alcohol and tobacco use among teens have been declining, yet other forms of substance use, such as vaping and marijuana usage, have been increasing. A considerable amount of adolescent substance use occurs within social environments, such as parties and celebrations with their friends, but the lives of adolescents extend over a variety of important social contexts, all of which may impact their perceptions of substances, and the eventual likelihood of their use. The different contexts can contain both protective and risk factors, and these can also vary considerably by gender. These analyses revealed that the overall substance use patterns of adolescent females and males, while similar in terms of their general patterns,

were nonetheless affected in unique manners by the different social contexts in which adolescents go about their lives, on a daily basis.

As shown in the multivariate analyses, the relative impact of peers, family, school, and work contexts were all significant among females and males, and across all of the three substances examined, herein. In terms of alcohol use, adolescent females and males were both readily affected by their peers, as having friends who drink, coupled together with spending more time out, was associated with higher rates of adolescent drinking. Among teens, substance use frequently happens within a social event, and when they spend more time together, there will understandably be peer pressure and the desire to "fit it" with the crowd. The desire for peer acceptance can be quite alluring for many adolescents, leading them to do precisely what their mothers warn them against – doing the same things that their friends are doing. Beyond the peer context, though, females' drinking behaviors were substantially affected by the family context (fights with their parents), while males' drinking was impacted by the school context (skipping school). While specific issues within parent-adolescent relationships cannot be fully discerned from this data, it does seem plausible to assert that many parents may be more lenient if their sons drink ("boys will be boys"), yet take a much stronger stance against their daughters doing the same. As compared to their adolescent daughters and sons, parents may adhere to more traditional gender role attitudes, which may lead to a harsher reaction concerning alcohol consumption by girls.

Contextual factors also varied in terms of vaping usage patterns, as females' vaping was shown to be substantially affected by peer factors, while no significant peer associations were revealed among males. It is possible that vaping, like the smoking of traditional cigarettes, is more strongly linked to the desire for peer approval among females (as previously noted). While the vaping behaviors of both girls and boys were each affected by the family and school context, it appears that family contextual factors yielded more influence among adolescent males, while school contextual factors were more influential among females. Fights with parents, along with high school grades, affected females and males in very similar manners, yet parental educational attainment was significantly associated with boys' vaping (but not girls'), while skipping school was associated with girls' vaping (but not boys'). Within the ecodevelopmental perspective, these differences again underscore the

unique manners by which social contexts can lead to distinct effects for adolescent females and males.

The multivariate models for marijuana use also suggest that there are quite unique differences concerning how contextual factors influence girls' and boys' substance use. As anticipated, peer usage of marijuana was positively associated with both girls' and boys' marijuana use. Similarly, school factors yielded very similar effects upon the marijuana use of both adolescent females and males. Among boys, though, the family context substantially affected marijuana use, while the work context was more strongly associated with females' marijuana use. Indeed, the distinction between the two contexts, family and work, upon boys' and girls' marijuana usage, was quite striking, and again demonstrated not only the individual manners by which each context affected adolescent substance use, but also the gendered effects within those contexts.

The use of various substances by adolescents has been shown to be linked to a wide array of deleterious effects, and a better understanding of how patterns of substance use develop and are maintained by adolescents is absolutely warranted. Within the ecodevelopmental framework, the context-specific effects are quite evident, as are the specific variations shown within these in terms of gender. Further investigation is necessary, as the cross-sectional data used herein does not provide the opportunity to more fully assess the nuances and discrete effects of each social context upon the substance use patterns by adolescent girls and boys. While these findings do demonstrate the relative strength of peer influence upon both females and males, the substantial impact of the family context upon males, the clear effects of school engagement and performance for both sexes, and the peculiar effects of work upon females, there remains a need to better comprehend differences across substances, along with obtaining a clearer understanding of how substance use begins and proceeds, over time. Future studies should focus more precisely upon how both the nature of social contexts in adolescence and patterns of substance use change over this stage of life, with a closer view of how substance use changes over the adolescent years.

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