

Resilient Youth in the Foster Care System: Examining the Impact of Risk and Protective  
Factors on Adolescent Substance Use

by

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## ABSTRACT

Although child welfare services are anticipated, in part, to lessen the negative influence of maltreatment on childhood and adolescent development, there is evidence that involvement in the foster care system negatively affects adolescent substance use. Within the literature, limited empirical research has emerged in regard to this issue. The present study aims to fill this critical gap in the literature by examining the association between baseline biological, psychological, and social risk and protective factors on adolescent involvement in substance use, and frequency of substance use, over a period of 24 months for foster care involved youth. Furthermore, the present study compares substance use behaviors between youth with differing experiences of maltreatment subtypes and severity levels. Data come from VOYAGES, a longitudinal study of older adolescents in the custody of the Missouri Children's Division for foster care services. The current analysis reports on those youth who completed both the baseline and the final interview (N=323). Key findings include significant associations between baseline peer substance use, lowered levels of school commitment, mentorship, and familial support with later adolescent substance use. Overall, the existence of numerous individual risk factors far outweighs the potential of protective factors buffering against subsequent substance use in the current study. The foster care system, although well-intentioned, potentially barricades individuals from successfully navigating through adolescence and early adulthood without engaging in risky behaviors such as substance use. Given the high prevalence of substance use among those placed in the care of the foster care system, prevention efforts for this population requires an improved understanding of psychosocial risk and protective factors.

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## INTRODUCTION

On any given day, as many as 440,000 adolescents can be found residing in the care and custody of the U.S. foster care system (U.S. Department of Health and Human Services, 2018). Although child welfare services are anticipated, in part, to lessen the negative influence of maltreatment on childhood and adolescent development, there is evidence that involvement in the foster care system can negatively affect adolescent substance use (Pilowsky & Wu, 2006; Young, 2005). As youth in the foster care system begin to reach the late adolescent and early adulthood developmental periods, many are presented with significant barriers to successful life outcomes. Further complicating this already vulnerable developmental period is the problematic use of alcohol, marijuana, and other illicit drugs (Braciszewski & Stout, 2012). Generally, substance use is known to increase throughout adolescence, reaching its peak in young adulthood (Brown, McGue, Maggs, Schulenberg, Hingson, Swarzwelder, et al., 2008). Despite decades of research dedicated to the outcomes of foster system involved youth, only within the recent years have researchers begun to examine alcohol, marijuana, and other illicit drug use in this vulnerable population (Braciszewski & Stout, 2012). The initiation and continuation of alcohol and illicit drug use are associated with an array of adverse physical, emotional, and social problems; thus, establishing empirical preventative and intervention efforts for substance use is crucial. Furthermore, such efforts are even more crucial for foster care system involved youth, given their already high risk for negative life outcomes (Braciszewski & Stout, 2012; Barn & Tan, 2015; Courtney & Dworsky, 2006; Thompson & Auslander, 2007).

Although a number of studies report consistent evidence that the recipients of child welfare services may experience increased rates of substance use (Barn & Tan, 2015; Braciszewski, Moore, & Stout, 2014; Pilowsky & Wu, 2006; Young, 2005), the understanding of risk factors associated with substance use among foster care youth remains unclear. To help shed light on the already disadvantaged population of youth with unstable and shaky life experiences, a number of prior studies have identified factors associated with an increased risk of substance use among system involved youth including: gender, age, experiences of abuse and/or neglect, internalizing symptomology (Aarons, Hazen, Leslie, Hough, Monn, Connelly, et al., 2008; Barn & Tan, 2014; Thomas & Auslander, 2007; Traube, James, Zhang, & Landsverk, 2012; Vaughn, Ollie, McMillen, Scott, & Munson, 2007), substance using and deviant peer (Aarons, et al., 2008; Thompson & Auslander, 2007), and lowered levels of caregiver involvement and support (Wall & Kohl, 2007). These associated demographic, psychosocial, and contextual risk factors between youth involved in child welfare services and substance use can be applied to the hazy and understudied experiences of youth involved in the foster care system. Although an evident association has been discovered between maltreated youth and elevated risk of substance use, relatively little empirical attention has been devoted to maltreated youth within the foster care system.

Much of the research on children and adolescents in high-risk environments, such as those who have experienced abuse and neglect, have focused on negative outcomes in an individual's life. Comparatively, much can be learned from looking at the positive outcomes of maltreated children and adolescents who have adapted and fared relatively well; who is resilient and why? Although many of the previously mentioned risk factors



have been found associated with increased risk for engaging in substance use, protective factors that decrease risk include: perceived level of caregiver or familial support (Barn & Tan, 2015; Cheng & Lo, 2010; Guibord, Bell, Romano, & Rouillard, 2011; Masten, 2004; Masten & Reed, 2002; Traube, James, Zhang, & Landsverk, 2012; Wall & Kohl, 2007), relationship with a mentor (Barn & Tan, 2015), greater problem solving skills and self-efficacy (Barn & Tan, 2015; Masten, 2004; Masten & Reed, 2002), educational attainment (Barn & Tan, 2015; Guibord et al., 2011; Masten, 2004), school commitment (Guibord et al., 2001; Kohlenberg et al., 2002; Traube et al., 2012), and employment (Legault, Anawati, & Flynn, 2006). Due to the association between the previous listed factors and reduced use of substance, these factors may lend to the protection or defense of foster youth engaging in substance use as well. Even with these findings, researchers are slowly illuminating the scope of this problem among foster care system involved adolescents and substance use. Utilizing data from a longitudinal cohort study of foster care involved youth, the Mental Health Services Use of Youth Leaving Foster Care (VOYAGES), the objective of the present study is to examine the relationship between baseline biological, psychosocial, and social risk and protective factors on the likelihood of an adolescent engaging in substance use and the frequency of substance use behaviors over a 24-month period for foster care involved adolescents.

## LITERATURE REVIEW

The child welfare system, including the foster care system, operates under three guiding principles: 1) to provide the assurance of safety through prevention efforts and responding to the maltreatment of children, 2) ensure the provision of permanency by ensuring stable living conditions and situations, and 3) focus on the physical, mental

health, and educational needs of children to obtain ideal levels of adjustment (Children's Bureau, 2018). Although the foster care system is intended to reduce and diminish the negative impact of challenging and difficult experiences on adolescent development, there is evidence that adolescents who receive services through child welfare agencies, such as foster care, experience adverse substance using outcomes (Braciszewski & Stout, 2012; Dennis, 2004; Groze, McMillen, & Haines-Simeon, 1993; Simms, Dubowitz, & Szilagyi, 2000; Thompson & Auslander, 2007; Traube, James, Zhang, & Landsverk, 2012).

### **Substance Use Among Foster Care Adolescents**

Estimates of substance use among foster care system involved adolescent vary depending on how use is measured (Wall & Kohl, 2007), such as by frequency, substance type, or timing of use, in addition to the developmental period being examined (Pilowsky & Wu, 2006; Traube et al., 2012; Wall & Kohl, 2007). Within the general adolescent population, alcohol and marijuana use tends to increase throughout the period of late adolescence into early adulthood (SAMSHA, 2006; Wall & Kohl, 2007). However, there is disagreement about how rates of substance use among populations involved with child welfare services and the general adolescent population are comparable, with even less known about foster care involved youth (Wall & Kohl, 2007). In regard to the general adolescent population, alarming rates of overall lifetime substance use were revealed with over 35% of early adolescents reporting drinking alcohol; 17% reporting marijuana use; and over 10% reporting some type of hard drug use (U.S. Department of Health and Human Services, Administration for Children, Youth, and Families, 2005). As compared to youth in the general population, youth involved in the foster care system endorse

similar rates of alcohol use with approximately 40% of foster youth reporting overall lifetime use (Johnston et al., 2007; Thompson & Auslander, 2007; Vaughn, Ollie, McMillen, Scott, & Munson, 2007). Comparatively, when examining marijuana use within the past six months, youth involved in the foster care system endorse much higher rates of use than the general adolescent population with around 37% reporting marijuana use (Johnston et al., 2007; Thompson & Auslander, 2007; Vaughn, Ollie, McMillen, Scott, & Munson, 2007). This illuminates a current gap in the literature, due to no one yet reporting on the rates and risk and protective factors of alcohol and marijuana use among foster youth as they transition through adolescence and into early adulthood.

### **Risk and Protective Factors for Substance Use**

Individuals with experience within the foster care system as children and youth have been found to report not only substance use later in adulthood, but higher rates of overall substance use as well (Grella & Greenwell, 2006; Traube et al., 2012; Zlotnick, Tam, & Robertson, 2004). Furthermore, youth with history residing in foster homes were largely more likely to engage in substance use than their peers (Huang & Connell, 2019; Pilowsky & Wu, 2006). Numerous factors have been associated with the occurrence of adolescent substance use and substance use behaviors. It has hypothesized that risk and protective factors exist and operate across multiple ecological levels (Raviv, Taussig, Culhane, & Garrido, 2010). Although a number of characteristics outlined by the social development model may influence adolescent substance use (see Hawkins, Catalano, & Miller, 1992), characteristics of the adolescent (commitment to school, depression, employment, self-efficacy, history of abuse, and severity of abuse), family (familial support, dependable mentorship, and parental substance use), and peer group (substance

using peers) are the focus of the current study. The social development model (Catalano & Hawkins, 1996; Hawkins, Catalano, & Miller, 1992), a broad ecological approach, emphasizes the critical influence of the individual, family, and community have on adolescent substance use through the means of attachment and commitment. It has been indicated that youth who excel in school, have increased levels of school involvement, and have strong family attachments are at a lower risk of engaging in adolescent substance use behaviors and having a barrier of protection to “shield” them (Catalano & Hawkins, 1996; Wall & Kohl, 2007). Much of the literature surrounding risk and protective factors utilizes a developmental approach, as does the previously mentioned model, to understand the influence of both internal and external forces on outcomes. In a transactional model the impact of environmental forces, caregiver characteristics, and individual child/youth characteristics all influence each other to create a compounding contribution to the outcomes of child development (Sameroff & Chandler, 1975). The following sections will provide a more in-depth discussion of risk and protective factors and their influence on adolescent substance use.

#### *Risk Factors Associated with Adolescent Substance Use*

A multitude of vulnerabilities associated with adolescents’ experiences in foster care is often examined in terms of risk factors (Barn & Tan, 2015). Overall, the risk factors for adolescent substance use among foster care system involved youth remains largely unidentified. A number of social, psychosocial, and contextual risk factors have been discovered to be associated with adolescent substance use within the literature. In terms of ethnicity and gender, limited understanding of the association with substance use has been brought to light due to mixed findings. Much of the findings vary based upon

the sample used, theoretical framework, and variables included in the study. There is some empirical evidence to suggest that youth who identify as Caucasian tend to be more susceptible to substance use as compared to youth identifying as African American (Barn & Tan, 2015; Guibord et al., 2001; SAMHSA, 2005; Vaughn et al., 2007; Wall & Kohl, 2007). As compared to their African American counterparts, Caucasian adolescents with prior experience in the foster care system were more likely to have used alcohol or marijuana in the past year (SAMHSA, 2005; Taussig & Talmi, 2001).

Among maltreated adolescents, prior research has discovered that past-year substance use, including alcohol and marijuana use, did not significantly vary based upon race (Braciszewski & Stout, 2012; Taussig & Talmi, 2001). Using the same maltreated adolescent sample, it was found that gender was not a significant predictor of overall substance use, nor significant in predicting levels of substance use (Taussig, Clyman, & Landsverk, 2001). Similar to the findings of the previous study, a number of studies fail to find support of gender differences in alcohol or illicit substance use (SAMHSA, 2005; Thompson & Auslander, 2007), however, a limited number of studies identified gender as a significant predictor of substance use (Aarons et al., 2008; Barn & Tan, 2015). Although the previously mentioned studies may not provide definitive evidence of alcohol and marijuana use among current foster care adolescents due to their retrospective nature, they suggest that identifying as Caucasian or being a male in the foster care system is likely to be associated with an increased likelihood for the use of alcohol and marijuana.

In addition to the sociodemographic factors, a number of studies have identified several factors associated with adolescent substance use. It has been found that history of

abuse (Aarons et al., 2008; Pilowsky & Wu, 2006; Thomas & Auslander, 2007; Vaughn et al., 2007; Wall & Kohl, 2007), presence of internalizing or externalizing disorders (Aarons et al., 2008; Wall & Kohl, 2007), peer or sibling substance use (Aarons et al., 2008; Thompson & Auslander, 2007; Vaughn et al., 2007), and lowered commitment to school (e.g., skipping school, poor academic achievement, expulsion from school) (Barn & Tan, 2015; Thompson & Auslander, 2007) were significantly related to an increased risk for substance use and heightened frequency of use.

When examining school-related influences, lower levels of school commitment have been associated with reduced levels of use of alcohol and marijuana among adolescents in the foster care system (Huizinga et al., 1994; Kohlenberg, Nordlund, Lowin, & Treichler, 2002; Thompson & Auslander, 2007; Wall & Kohl, 2016), with prior studies finding evidence of skipping school, lowered grades, and being associated with peers who exhibit lowered commitment to school indicating a heightened risk of substance use and overall heightened frequency of use. Additionally, significant adversities during late adolescence and early adulthood directly associated with school commitment levels, such as subsequent unemployment, poverty and homelessness, have strong links with substance use and misuse (Barn & Tan, 2015; Feng, DeBeck, Kerr, Mathias, Montaner, & Wood, 2013; Henkel, 2011).

One of the most consistent and supported correlates of adolescent substance use is peer substance use (Aarons et al., 2008; Braciszewski & Stout, 2012; Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Hawkins & Catalano, 1996; Hawkins, Catalano, & Miller, 1992; Newcomb & Bentler, 1986). Given the proliferation of alcohol use and marijuana use amongst adolescents, vulnerable adolescents, such as though involved in

the foster care system, are highly likely to be exposed to substance using peers and offers to engage in substance use and related behaviors. While the association between substance using peers and adolescent substance use is empirically shown throughout the literature, relatively limited research has examined the influence of substance using peers in regard to foster care system involved adolescents and their use and frequency of use behaviors.

Researchers have highlighted an association between mental health and substance use among adolescents, particularly those involved in the child welfare system and foster care system (Aarons et al., 2008; Barn & Tan, 2015; Havlicek et al., 2013; Traube et al., 2012; Vaughn et al., 2007; Wall & Kohl, 2007). In addition to the heightened rates of substance use among foster care involved youth with mental health difficulties and diagnoses (Vaughn et al., 2007), mental health difficulties and diagnoses seem to precede adolescent alcohol and marijuana use (Aarons, Brown, Hough, Garland, & Wood, 2001; Vaughn et al., 2007). Only a limited number of studies have documented empirical evidence of an association between mental health functioning and adolescent substance use among those in the foster care system, although much of the findings yield mixed results due to varying sample sizes, measures, and outcomes (Aarons et al., 2008; Barn & Tan, 2015; Guibord et al., 2011; Helstrom, Bryan, Hutchison, Riggs, & Blechman, 2004; Traube et al., 2012; Vaughn et al., 2007). Thus, the association between mental health functioning and substance use among foster care system involved youth, remains uncertain.

It has been found that adverse family environments in childhood and early adolescence may increase vulnerability to later substance use (Blake, Tung, Langley, &

Waterman, 2018; Skeer, McCormick, Normand, Buka, & Gilman, 2009; Thompson & Auslander, 2007). Several factors indicative of family adversity are common to youth involved in the foster care system. In many foster care involved families, maltreatment (e.g., abuse and/or neglect) is particularly prevalent and pervasive (Blake, Tung, Langley, & Waterman, 2018). Although the link between maltreatment and adolescent substance use has received empirical attention, other risk factors play a similar role among children involved in the foster care system. The unreliable caregiving inherent to maltreating families also emerges through unpredictable caregiver monitoring, attachment, and support among adolescents in the foster care system. This influence of unreliability is evident with a limited significant association found between the number of foster care placements and level of substance use (Aarons et al., 2008). Additionally, a number of studies have found significant associations between a history of abuse and substance use and frequency of use (Aarons et al., 2008; Blake, Tung, Langley, & Waterman, 2018; Braciszewski & Stout, 2012; Pilowsky & Wu, 2006; Thompson & Auslander, 2007; Vaughn et al., 2007; Wall & Kohl, 2007). Although other variables may similarly predict substance use outcomes, a dearth of relevant literature exists limiting the knowledge of the association of maltreatment on subsequent substance use.

#### *Protective Factors Associated with Adolescent Substance Use*

Notably, several positive or protective factors may promote more well-adjusted outcomes for foster care involved adolescents. Self-efficacy, the ability to grow from one's experiences, has been linked to lower rates substance use in adolescents (Blake, Tung, Langley, & Waterman, 2018). Furthermore, higher self-efficacy has the capability to protect vulnerable adolescents from becoming involved with deviant and substance



using peers, which may very well reduce the risk of engaging in substance use themselves (Stepp, Pardini, Loeber, & Morris, 2011).

For adolescents in the foster care system, self-efficacy appears to have positive effects, resulting in milestones such as graduating high school, attending secondary education, gaining successful employment, and fostering healthy relationships with peers and other adults in their lives (Blake, Tung, Langley, & Waterman, 2018; Drapeau, Saint-Jacques, Lépine, Bégin, & Bernard, 2007; Legault, Anawati, & Flynn, 2006). With these positive outcomes in mind, it can be assumed that self-competency, employment, familial support, and having a dependable mentor will provide a buffer or protective barrier against subsequent substance use in adolescence.

Empirical evidence suggests that mentors may influence positive developmental outcomes through their influence on adolescents' decision making processes (Steinberg, 2001). Through the advantage of having an outside-looking-in viewpoint, mentors have the ability to provide substantial positive influence for adolescents involved in the foster care system (Rhodes, 2002; Steinberg, 2001). Mentor relationships have the potential to impact substance use and substance use behaviors by providing a safe and stable atmosphere for adolescents to disclose and build relationship skills. This positive influence may support the ability to negotiate the hardships and obstacles that may arise (Blake, Tung, Langley, & Waterman, 2018). Having a positive and dependable mentor, in turn, could provide substantial implications for substance use prevention, reduction, and rehabilitation. Enriched connections with a mentor may lead to reduced substance use and substance using behaviors (Bogenschneider, Wu, Raffaelli, & Tsay, 1998),

hopefully buffering against the negative association of peer and familial substance use (Blake, Tung, Langley, & Waterman, 2018; Oetting & Beauvais, 1986).

Research suggests that the extent to which an adolescent feels supported, trusted, and cared for by their parent or caregiver appears to influence substance use and the frequency of use (Barn & Tan, 2015; Cheng & Lo, 2010; Guibord, Bell, Romano, & Rouillard, 2011; Kohlenberg et al., 2002; Masten, 2004; Masten & Reed, 2002; Traube, James, Zhang, & Landsverk, 2012; Wall & Kohl, 2007). Lower levels of family support and attachment has been found to increase the odds of using marijuana for adolescents involved in foster care (Kohlenberg et al., 2002). It appears that support is associated with lower levels of alcohol use and later onset of marijuana (Guibord et al., 2011; Wade & Pevalin, 2005). Furthermore, adolescents who indicated increased self-efficacy and greater problem solving skills tended to express increased levels of resilience when facing difficulties in life and decreased odds of engaging in substance use (Barn & Tan, 2015; Masten, 2004; Masten & Reed, 2002), while unemployment actually increased the odds of engaging in substance use (Drapeau et al., 2007; Legault, Anawati, & Flynn, 2006). However, it has been consistently brought to attention the lack of readily available resources and services for adolescents in and exiting the foster care system (Barn & Tan, 2015; Stein, 2006). Consequently, findings from the aforementioned studies reveal the significance of supportive networks, life-skills training (e.g., increased self-efficacy and employment opportunities), and positive relationships with parents, caregivers, and mentors.

Previous research has focused on main indicators that may produce risk or promote resilience to provide effective policy and practice interventions for adolescents

involved in the already high-risk foster care system. Nonetheless, our understanding of foster care system involved adolescents, substance use, and risk and protective factors remains largely disjointed. Given the dearth of research examining the contribution of risk and protective factors on predicting subsequent substance use, the crucial need to understand these associations should be at the forefront of both researcher and practitioner minds alike, to ensure satisfactory care to this vulnerable population.

### CURRENT STUDY

The current study examines whether sociodemographic and psychosocial protective factors provide a barrier against the deleterious pathway of adversity and risk factors within foster care system involved youth to substance use during adolescence and early adulthood. The phenomenon of resilience, the developmental process reflecting evidence of positive adaptation and adjustment despite significant life adversity (Luthar & Cicchetti, 2000), is brought to attention through the current study to try and understand the relationship between foster care system involved adolescents and subsequent substance use and frequency of use. The use of alcohol and marijuana within the general adolescent populations has been linked to a variety of risk markers, and the foster care system is riddled with many of the same factors.

Specifically, the following three research questions guided the current study: (1) Do substance use outcomes differ based upon the type and severity of maltreatment the youth has experienced? It is hypothesized that experiences of abuse (e.g., physical abuse, emotional abuse, and sexual abuse) will significantly increase the likelihood that an individual will engage in substance use, as well as increase the frequency of substance use. It is anticipated that those with experiences of sexual abuse and/or physical abuse

will face an increased likelihood of substance use. Maltreatment characteristics have been found to influence children's outcomes, with the exposure to multiple abuse types and heightened severity of abuse(s) increasing the risk for behavioral problems (Cicchetti, & Barnett, 1994). In regard to the severity of abuse, it is hypothesized that adolescents with higher levels of abuse severity will face an increased likelihood of substance use, as well as, the frequency of use. (2) What individual and social risk and protective factors are related to the use of alcohol and marijuana among adolescents in the foster care system? Of the numerous negative experiences an adolescent in the foster care system may face, it is hypothesized that abuse, severity of abuse, parent and peer substance, depression, and lowered school commitment will increase the likelihood of substance use. Additionally, it is hypothesized that the following variables will provide a buffer against the many risks and difficulties to reduce the likelihood of substance use: employment, heightened levels of familial support, dependable mentorship, and self-efficacy. (3) Do the individual and social risk and protective factors associated with substance use differ based on race and gender? In line with past research, it is hypothesized that the prevalence of substance use and frequency of use will be higher in adolescent males and adolescents who identify as white/Caucasian. Information and knowledge derived from this study can provide valuable insight to developing efficient substance use prevention and treatment policies based upon the balance of risk and protective factors for these vulnerable adolescents.

## METHODOLOGY

### **Research and Design**

For the purposes of the current study, secondary analysis of data from a longitudinal cohort study of 406 adolescents in the custody of the Missouri Children's Division (MCD) (VOYAGES; Mental Health Service Use of Youth Leaving Foster Care) were utilized. The primary purpose of the VOYAGES study was to explore changes in mental health service use as youth leave the foster care system and transition to independence. Participants in the study were identified through the Missouri Division of Family Services (MDFS), with 406 youths aged 17 at the time of the study interviewed out of 451 eligible youths. Youth were interviewed every three months from age 17 to age 19. Although a total of nine interviews were conducted, not all measures were collected at each time point. The baseline interview was conducted in person close to each youth's 17<sup>th</sup> birthday. The final interview, also in-person, was conducted when youth were approximately 19 years old. Interviews two-through-eight were conducted over the phone every three months. Youth were interviewed by trained professional interviewers using a structured protocol in conjunction with a history calendar to improve recall accuracy. The Washington University Human Subjects Committee approved all procedures in advance. If custody changed during the course of the study, new informed consent procedures were implemented to gather the consent of the new legal guardian. Although not every youth involved in the VOYAGES study has experienced maltreatment in their lifetime, a large majority of the youth retrospectively reported exposure to abusive and neglectful environments during childhood and adolescence before age 17. The current study utilizes a longitudinal analysis on foster care system

involved youth who completed both the baseline and the final interview (N=323). Youth not retained for the final interview were excluded, as they lacked information on key indicators of resilient functioning. The full descriptive statistics for the current study can be found in Table 1. The key focus of the current study is to understand the nature and extent of adolescent substance use and the frequency of substance use through the examination of individual risk and protective factors in a foster care system involved adolescent sample.

**Table 1.**

Descriptive statistics of demographic characteristics, risk, and protective factors (n = 323).

Predictors	Frequency (n)	(SD)	Range
<b>Demographics</b>			
Gender			
Female	60.37% (195)	-	0 - 1
Male	39.63% (128)	-	0 - 1
Race			
Non-White	58.82% (190)	-	0 - 1
White	41.18% (133)	-	0 - 1
<b>Risk factors</b>			
Physically abused	43.65% (182)	-	0 - 1
Emotionally abused	57.89% (187)	-	0 - 1
Sexually abused	35.60% (115)	-	0 - 1
Abuse Severity			
No Abuse	29.10% (94)		0 - 3
Low Severity	19.50% (63)		0 - 3
Moderate Severity	21.67% (70)		0 - 3
Severe/Extreme Severity	29.72% (96)		0 - 3
Parental substance use	77.09% (249)	-	0 - 1
Peer substance use	68.73% (222)	-	0 - 1
Low school commitment	39.01% (126)	-	0 - 1
<b>Protective factors</b>			
Employment	65.02% (210)	-	0 - 1
Home support	46.13% (149)	-	0 - 1
Mentorship	58.51% (189)	-	0 - 1
Self-efficacy	55.42% (179)	-	0 - 1
Predictors	Mean	(SD)	Range
<b>Risk factors</b>			
Depression severity	17.68	17.25	0 - 87.87

## **Dependent Variables**

**Substance use.** Substance use was measured at the final wave of data collection (Wave 9) with questions from the Diagnostic Interview Schedule for Children and Adolescents (DICA-IV) (Reich, Welner, & Herjanic, 2002) and modified portions of the DIS-IV (Robins et al., 1995). Substance use was assessed through two dichotomous variables indicating whether or not the youth reported having ever used substances from two categories (e.g., alcohol and marijuana). Alcohol use was dichotomously measured by asking, “In the past year, have you drunk any beer, wine, wine coolers, hard liquor, or other kind of drink with alcohol in it?” Marijuana use was dichotomously measured by asking, “Have you in the past 12 months used marijuana or hashish?” The reference group calculated for both alcohol use and marijuana use was adolescents who reported no use of either substance.

**Frequency of substance use.** The frequency of substance use was measured categorically at the final wave of data collection with questions from the Diagnostic Interview Schedule for Children and Adolescents (DICA-IV) (Reich, Welner, & Herjanic, 2002) and modified portions of the DIS-IV (Robins et al., 1995). Frequency of use for alcohol was measured by asking: On how many occasions have you drank beer, wine, or liquor in the past year? Frequency of use for marijuana was measured by asking: In the past year how many times have you used marijuana? Responses for both substances was categorically coded. *No use* (0) indicated an adolescent did not use either of the substances in the past year. *Low use* (1) indicated that an adolescent participated in use one to five times, moderate use (2) indicated an adolescent participated in use six to

twenty times, and *high use* (3) indicated an adolescent participated in use over twenty times in the past year.

### **Independent Variables**

**Abuse.** Abuse was measured retrospectively through self-report lifetime maltreatment. Abuse type was dichotomously measured for each subtype at baseline with questions regarding physical and emotional abuse from the Childhood Trauma Questionnaire (CTQ) (Bernstein & Fink, 1998), while sexual abuse was measured with three questions adapted from Russel (1986). Adolescents may fall within multiple categories of abuse. Some of the questions measuring abuse included, “When I was growing up, people in my family hit me so hard that it left me with bruises or marks”, “When I was growing up, I felt that someone in my family hated me”, and “Has anyone ever had vaginal sex, oral sex, or anal sex with you against your wishes?”. In regard to physical and emotional abuse, only those experiencing moderate levels of abuse were included in the study as *abused* (1) compared to *not abused* (0). Moderate abuse was determined by the severity cutoffs outlined by Bernstein & Fink (1998). In regard to sexual abuse, any endorsement of experiences was coded as *abused* (1) as compared to *not abused* (0).

**Severity of abuse** was measured based upon the questions from the CTQ (Bernstein & Fink, 1998), with the adolescent providing a response of abuse severity on a four point Likert-scale, with responses ranging from “*Never true*” to “*Very often true*”. Scores for each question were then averaged to provide an overall abuse severity score. Upon the classification schema as outlined by Bernstein and Fink (1998) severity was coded from (0) *none to low*; (1) *moderate to severe*; and (2) *severe to extreme*.



**Parental substance use.** Parental substance use was measured by a single dichotomous variable, with adolescents endorsing whether or not a parent engaged in or abused any substances such as alcohol, marijuana, or other illicit drugs.

**Peer substance use.** Peer substance use was measured by a single dichotomous variable, with adolescents endorsing whether or not they interacted with peers who engage in substance use.

**Depression severity.** Depression was measured using the Depression - Arkansas scale (D-ARK), an 11 item instrument used to determine symptom criteria for DSM-IV Major Depressive Disorder (MDD). Adolescents were asked to mark how often during the previous four weeks they have experienced each symptom: “*Not at all*”, “*1 to 3 days a week*”, “*Most days a week*”, or “*Nearly every day for at least 4 weeks.*” Questions such as “Have you thought a lot about a specific way to commit suicide?” and “How often in the past four weeks have you felt depressed, blue, or in low spirits for most of the day?” were used to measure severity of depression. Severity of depression was scored as a symptom-severity scale with higher mean scores indicating higher severity of depression.

**Commitment to school.** Commitment to school was measured through a combined score of three individual questions which include, “What kind of grades did you average last semester, or the last semester you were in school?”, “In the last year, how many times did you skip school without permission?”, and “Do you enjoy school?”. Adolescents endorsing low grades (below a C grade point average), any school skipping, and low levels of school enjoyment were coded as having a low level of school commitment.

**Employment.** Employment was measured by a single dichotomous variable, with an adolescent endorsing job status based on the question “Have you ever been employed, not including working for the place you currently live?”. Responses were coded as *not employed* (0) or *employed* (1).

**Family support.** Family support was measured by a single dichotomous variable, with an adolescent endorsing high levels of family support if they felt as though they could trust and depend on their family to help them out or provide support when they needed it. Adolescents provided responses ranging from “*I do not have any support at home*”, “*I have very little support at home*”, “*I have moderate levels of support at home*”, and “*I have high levels of support at home.*” Family support was coded as *none to low levels of family support* (0) or *moderate to high levels of family support* (1).

**Mentorship.** Mentorship was measured by a single dichotomous variable, with an adolescent endorsing the existence of a mentor in their life. A mentor was described by the following definition: “A mentor is an adult who is often older than you, and is willing to listen, share his or her own experiences, and guide you through some part or area of your life.” Mentorship was coded as *having a mentor* (1) and *not having a mentor* (0).

**Self-efficacy.** Efficacy was measured by a five point Likert-type scale with responses ranging from “*Not at all like me*” (0) to “*Very like me*” (4), with higher mean scores indicating more perceived positive by-products from adverse experiences. Adolescents were asked 11 questions such as, “My difficult experiences taught me I can handle anything” and “Because of my difficult experiences, I am a more effective person” to examine their level of self-efficacy.

## Control Variables

**Race.** To measure race, a dummy variable was created from adolescent's response to: "How do you normally describe yourself in terms of race or ethnicity?". Responses were coded as *white/Caucasian* (1) or *non-White* (0).

**Gender.** For gender, the interviewer was asked to determine the sex of the adolescent based upon appearance. A dummy variable was created with an adolescent identified as *female* (0) or *male* (1).

## ANALYTIC PLAN

For the current analysis, substance use behavior within the last year were examined at Wave 9, the final wave of data collection. The design of the study allows for the examination of baseline individual risk and protective factors on subsequent substance use and substance use behaviors after a period of 24 months. To derive estimates of alcohol and marijuana use behaviors, descriptive analyses were conducted for each of the dependent variables. In regard to substance use, due to the dichotomous nature of the two outcome variables, logistic regression analyses were conducted to predict substance use behaviors (alcohol use and marijuana use). Two separate sets of logistic regressions were executed. First, bivariate logistic regressions were performed for each sociodemographic factor, risk or protective factors, and dependent variable to determine the independent effects of each factor on the substance use outcomes. Second, predictor variables were entered sequentially in blocks into the multivariate regression model for each substance use outcome. The analysis begins by first regressing youth's substance use behaviors on the sociodemographic characteristics (e.g. gender and race). In the second step, the various types of psychosocial risk factors (e.g. abuse, severity of

abuse, low commitment to school, parental/caregiver drug use, depression, and peer substance use) were added to the models. After controlling for these factors, the final step added the range of protective factors (e.g. employment, heightened level of familial support, dependable/trustworthy mentor, and increased self-efficacy/capacity). The order of entry for the variable blocks reflect the interest in examining the contribution of protective factors over the overwhelming influence of risk factors.

In regard to the frequency of substance use, due to the categorical nature of the two outcome variables, ordinal logistic regression analyses were conducted to predict the frequency of substance use for both alcohol and marijuana. First, multivariate logistic regressions were performed for each sociodemographic factors, risk or protective factors, and dependent variable to determine the independent effects of each factor on the substance use outcomes. Second, similar to the first set of analyses, predictor variables were entered sequentially in blocks into the multivariate regression model for each substance use outcome. The analysis begins by first regressing youth's frequency of substance use on the sociodemographic characteristics (e.g. gender and race). In the second step, the various types of psychosocial risk factors (e.g. abuse, severity of abuse, low commitment to school, parental/caregiver drug use, depression, and peer substance use) were added to the models. After controlling for these factors, the final step added the range of positive stimuli (e.g. employment, heightened level of familial support, dependable/trustworthy mentor, and increased self-efficacy/capacity). As in the first set of analyses, the order of entry for the variable blocks reflect the interest in examining the contribution of protective factors over the overpowering influence of risk factors.

## RESULTS

### Sample Descriptives

Table 1 displays the descriptive statistics of the full sample. Among the 323 foster care involved youth, the sample was composed of 39.6% males and 60.4% female with a mean age of 16.99 years old at baseline. In terms of race/ethnicity, a smaller number of youth identified as white/Caucasian (41.2%), while the rest identified with a minority ethnic background (58.8%). In regard to maltreatment, almost three-fourths of the sampled youth had experiences of abuse (71%), with 43.6% experiencing physical abuse, 57.9% experiencing emotional abuse, and 35.6% experiencing sexual abuse. Additionally, among the youth with an endorsement of abuse, 19.5% experienced a low severity of abuse, 21.7% experienced moderate abuse, and 29.7% experienced severe or extreme abuse (does not reach 100% due to those without reports of abuse being excluded).

Over three-fourths of the sample reported substance use by a family member (77.1%) and a large majority of youth reported substance use by peers (68.7%). In terms of depression, 19.2% of youth meet the diagnostic criteria for major depressive disorder (MDD) with a mean severity score of 17.68. Sixty-five percent of young people were currently employed and 39% of youth reported low levels of school commitment. Less than half of the youth experienced a high level of support from home (46.1%), while over half of the youth reported exposure to and reliability of an adult mentor (58.5%). A little over half of the youth indicated high levels of self-efficacy in response to their negative life events (55.4%).

Overall, among the 323 foster care involved youth, over 66% self-reported substance use within the past year at the final wave of data collection. Of those endorsing substance use, 64.1% of youth reported using alcohol and 29.8% of youth reported using marijuana. In regard to frequency of alcohol use, a majority of youth reported low frequencies of alcohol use in the past year (36.8%) as compared to youth endorsing moderate use (14.6%) or high use (12.7%). In regard to frequency of marijuana use, a majority of youth reported high frequencies of marijuana use in the past year (17%) as compared to youth endorsing low use (6.5%) or moderate use (5.3%). Table 2 displays the descriptive statistics of substance use among youth who engaged in either alcohol or marijuana within the past year.

### **Independent Effects on Substance Use**

Logistic regression analyses were employed to determine the independent effects of demographic characteristics, risk, and protective factors on the odds of engaging in alcohol and marijuana use. In regard to alcohol, the only significant baseline risk factor related to increased odds of alcohol use within the past year was substance using peers (OR = 3.81,  $p < 0.001$ ). Youth with substance using peers are 3.81 times more likely to drink alcohol as compared to youth without substance using peers. Alternatively, none of the included factors reduced the likelihood of alcohol use for youth. Identifying as male, placed youth at an increased odds of engaging in alcohol use (OR = 1.675,  $p < 0.05$ ) as compared to females.

Several baseline risk factors were related to an increased likelihood of use for marijuana within the past year: familial history of substance use (OR = 1.992,  $p < 0.05$ ), substance using peers (OR = 4.261,  $p < 0.001$ ), and a low commitment to school (OR =

2.213,  $p < 0.01$ ) all increased the odds of youth engaging in marijuana use. Alternatively, only a high level of home support provided reduced the likelihood of marijuana use (OR = 0.576,  $p < 0.05$ ). Identifying as male, placed youth at a higher odds of engaging in marijuana use (OR = 1.879,  $p < 0.05$ ) as compared to females. Table 2 displays the descriptive and independent findings of substance use by baseline sociodemographic characteristics, risk, and protective factors for both alcohol and marijuana use.

**Table 2.**  
Descriptive statistics and bivariate regression results of demographics, risk, and protective factors for use (n = 323).

Predictors	Alcohol Use		Exp(B)	Marijuana Use		Exp(B)
	n	%		n	%	
<b>Demographics</b>						
<b>Gender</b>						
Female (n = 195)	116	59.5		46	23.6	
Male (n = 128)	91	71.1	<b>1.675 *</b>	47	36.7	<b>1.879 *</b>
<b>Race</b>						
Non-White (n = 190)	117	61.6		52	27.4	
White (n = 133)	90	67.7	1.306	41	30.8	1.183
<b>Risk factors</b>						
Physically abused (n = 182)	88	62.4	0.879	42	29.8	1.09
Emotionally abused (n = 187)	120	64.2	1.009	54	28.9	1.01
Sexually abused (n = 115)	73	63.5	0.96	35	30.4	1.131
<b>Abuse Severity</b>						
No Abuse (n = 94)	60	63.8	1.003	25	26.6	1.028
Low Severity (n = 63)	40	63.5		19	30.2	
Moderate Severity (n = 70)	46	65.7		22	31.4	
Severe/Extreme Severity (n = 96)	61	63.5		27	28.1	
Parental substance use (n = 249)	166	66.7	1.61	79	31.7	<b>1.992 *</b>
Depression severity	39	62.9	0.997	19	30.6	1.01
Peer substance use (n = 222)	164	73.9	<b>3.814 ***</b>	81	36.5	<b>4.261 ***</b>
Low school commitment	140	64.5	1.709	68	31.3	<b>2.213 **</b>
<b>Protective factors</b>						
Employment (n = 210)	141	67.1	1.455	64	30.5	1.27
Home support (n = 149)	94	63.1	0.923	34	22.8	<b>0.576 *</b>
Mentorship (n = 189)	126	66.7	1.309	53	28.0	0.916
Self-efficacy (n = 179)	120	67.0	1.3	49	27.4	0.857

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

## **Independent Effects on Frequency of Use**

Ordinal logistic regression analyses were employed to determine the independent effects of demographic characteristics, risk, and protective factors on the odds of frequency of use for alcohol and marijuana. A number of baseline risk factors were positively related to the frequency of alcohol use within the past year: identifying as white/Caucasian (OR = 1.61,  $p < 0.05$ ), being male (OR = 1.92,  $p < 0.01$ ), parental substance use (OR = 1.66,  $p < 0.05$ ), and substance using peers (OR = 3.69,  $p < 0.001$ ). Although it was hypothesized that a number of factors would provide protection or reduce the likelihood of falling within the low, moderate, or high use frequency category, no protective factors significantly reduced the odds.

Several baseline risk factors were related to the frequency of marijuana use within the past year: being male (OR = 1.82,  $p < 0.05$ ), parental substance use (OR = 2.03,  $p < 0.05$ ), substance using peers (OR = 4.41,  $p < 0.001$ ), and lowered levels of commitment to school (OR = 2.27,  $p < 0.01$ ). Only one protective factor, higher levels of support at home (OR = 0.56,  $p < 0.05$ ), significantly reduced the likelihood of falling within the low, moderate, or high use frequency category as compared to the no use category.

## **Substance Use Multivariate Findings**

Multivariate findings of the full logistic regression model results for both dependent variables measuring substance use in the past year are shown in Table 3. As previously mentioned in the analytic plan, each model for the dependent variables controlled for sociodemographic characteristics (race/ethnicity and gender), then all other variables were entered in blocks of variables groups (risk factors and protective factors). Results are presented for each step of analysis for both alcohol use and



marijuana use. Results are presented as odds ratios, although the full models present both coefficients and odds ratios.

The risk of engaging in alcohol use within the past year for youth involved in the study was only significantly associated with gender and baseline peer substance use. Gender was only significantly associated with an increased odds of engaging in alcohol use in the first block of analyses, but once risk factors and protective factors were added into the model gender was no longer significant in predicting alcohol use. This leads to the notion that while gender is significant in predicting the increased odds of an adolescent engaging in alcohol use, with males being 1.71 ( $p < 0.05$ ) times more likely than females to use, gender is no longer as important in predicting use once the salient impact of risk and protective factors are included. In the second block of the analysis, examining risk factors while controlling for sociodemographic characteristics, youth with substance using peers are 3.61 ( $p < 0.001$ ) times more likely to engage in alcohol use as compared to youth without substance using peers. In the final model, examining the impact of protective factors while controlling for sociodemographic characteristics and risk factors, youth with substance using peers are 3.5 ( $p < 0.001$ ) times more likely to engage in alcohol use as compared to youth without substance using peers.

The increased risk of engaging in marijuana use within the past year for youth involved in the study was associated with gender and baseline peer substance use and low commitment to school. Gender was significantly associated with an increased odds of marijuana use for all three blocks in the analysis, with males being 2.31 ( $p < 0.01$ ) times more likely than females for engaging in marijuana use in the final model. In the second block of analysis, examining risk factors while controlling for sociodemographic

characteristics, youth with substance using peers are at an increased odds (OR = 3.71,  $p < 0.001$ ) of use as compared to youth without substance using peers. Additionally, youth with a low level of commitment to school are at an increased odds (OR = 2.04,  $p < 0.01$ ) of marijuana use as compared to youth with high levels of school commitment. In the final model, examining the impact of protective factors while controlling for sociodemographic characteristics and risk factors, youth with substance using peers, albeit slightly lower once protective factors are included, are still at an increased odds of 3.48 ( $p < 0.001$ ) for use compared to those with non-using peers. In regard to low levels of commitment to school, youth are at an even more elevated odds of engaging in use once protective factors are included in the model. Youth with a low level of commitment to school are 2.12 ( $p < 0.01$ ) times more likely to use as compared to those with higher levels of commitment. Unlike alcohol use, one protective factor is significantly associated with a reduction in the odds of engaging in marijuana use. Youth with high levels of home support 0.54 ( $p < 0.05$ ) times less likely to use as compared to youth with lower levels of home support.

**Table 3.**  
Logistic regression analysis for variables predicting substance use, controlling for demographic variables.

Predictors	Alcohol Use, Exp(B)						Marijuana Use, Exp(B)					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Model 1: demographics</b>												
Male	1.71*	[1.06, 2.76]	1.59	[0.92, 2.76]	1.71	[0.97, 3.00]	1.91*	[1.17, 2.02]	1.98*	[1.10, 3.56]	2.31**	[1.26, 4.24]
White	1.35	[0.85, 2.17]	1.29	[0.77, 2.15]	1.24	[0.74, 2.09]	1.24	[0.75, 2.02]	1.29	[0.75, 2.22]	1.27	[0.72, 2.21]
<b>Model 2: risk factors</b>												
Physically abused			0.67	[0.34, 1.31]	0.67	[0.33, 1.33]			0.98	[0.48, 2.00]	0.63	[0.45, 1.92]
Emotionally abused			0.95	[0.41, 2.21]	0.9	[0.38, 2.12]			0.67	[0.28, 1.63]	0.99	[0.26, 1.55]
Sexually abused			0.83	[0.41, 1.68]	0.81	[0.40, 1.66]			1.02	[0.47, 2.18]	1	[0.46, 2.15]
<b>Abuse severity (reference is non-abused)</b>												
Low severity			1.03	[0.38, 2.77]	1.02	[0.37, 2.79]			1.23	[0.43, 3.50]	1.3	[0.45, 3.73]
Moderate severity			1.64	[0.51, 5.24]	1.79	[0.52, 5.83]			1.76	[0.51, 6.05]	2.03	[0.58, 7.14]
Severe/Extreme severity			2	[0.51, 7.77]	2.07	[0.52, 8.17]			1.48	[0.35, 6.36]	1.77	[0.40, 7.81]
Parental substance use			1.49	[0.84, 2.67]	1.48	[0.82, 2.67]			1.94	[0.97, 3.86]	1.85	[0.92, 3.71]
Depression severity			0.98	[0.75, 1.28]	1.02	[0.77, 1.35]			1.31	[0.98, 1.75]	1.28	[0.95, 1.73]
Peer substance use			<b>3.61***</b>	<b>[2.15, 6.05]</b>	<b>3.50***</b>	<b>[2.06, 5.95]</b>			<b>3.71***</b>	<b>[1.87, 7.35]</b>	<b>3.48***</b>	<b>[1.74, 6.97]</b>
School commitment			1.59	[0.95, 2.66]	1.62	[0.96, 2.73]			<b>2.04**</b>	<b>[1.20, 3.46]</b>	<b>2.17**</b>	<b>[1.24, 3.62]</b>
<b>Model 3: protective factors</b>												
Employment					1.21	[0.54, 1.50]					1.28	[0.71, 2.29]
Home support					0.9	[0.87, 2.44]					<b>0.54*</b>	<b>[0.31, 0.95]</b>
Mentorship					1.45	[0.76, 2.10]					1.01	[0.59, 1.74]
Self-efficacy					1.26	[0.09, 0.59]					0.96	[0.56, 1.64]

Note. \* p < .05, \*\* p < .01, \*\*\* p < .001. OR = odds ratios, CI = confidence intervals.

**Table 4.** Ordinal logistic regression analysis for variables predicting substance use frequency, controlling for demographic variables.

Predictors	Alcohol Frequency, Exp(B)						Marijuana Frequency, Exp(B)					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Model 1: demographics</b>												
Male	<b>2.06***</b>	[1.36, 3.14]	<b>1.96**</b>	[1.23, 3.12]	<b>2.24***</b>	[1.39, 3.62]	<b>1.85*</b>	[1.14, 3.00]	<b>1.86*</b>	[1.05, 3.30]	<b>2.17*</b>	[1.20, 3.94]
White	<b>1.76**</b>	[1.16, 2.66]	<b>1.69*</b>	[1.09, 2.60]	<b>1.59*</b>	[1.02, 2.46]	1.26	[0.78, 2.05]	1.31	[0.77, 2.22]	1.3	[0.75, 2.24]
<b>Model 2: risk factors</b>												
Physically abused			0.97	[0.56, 1.70]	0.92	[0.52, 1.63]			1.02	[0.51, 2.05]	0.97	[0.48, 1.98]
Emotionally abused			0.96	[0.47, 1.96]	0.89	[0.43, 1.82]			0.74	[0.31, 1.75]	0.69	[0.29, 1.66]
Sexually abused			1.11	[0.61, 2.02]	1.07	[0.59, 1.95]			1.05	[0.50, 2.20]	1.03	[0.49, 2.18]
<b>Abuse severity (reference is non-abused)</b>												
Low severity			1.01	[0.44, 2.36]	0.99	[0.42, 2.33]			1.17	[0.42, 3.22]	1.23	[0.44, 3.45]
Moderate severity			1.08	[0.41, 2.87]	1.25	[0.47, 3.35]			1.78	[0.54, 5.92]	2.07	[0.61, 7.02]
Severe/Extreme severity			1.2	[0.38, 3.76]	1.34	[0.42, 4.23]			1.35	[0.33, 5.62]	1.62	[0.38, 6.90]
Parental substance use			1.53	[0.92, 2.54]	1.52	[0.90, 2.55]			1.94	[0.98, 3.84]	1.87	[0.94, 3.71]
Depression severity			1.08	[0.85, 1.36]	1.11	[0.87, 1.41]			1.29	[0.98, 1.70]	1.26	[0.95, 1.68]
Peer substance use			<b>3.26***</b>	[2.01, 5.29]	<b>3.09***</b>	[1.89, 5.06]			<b>3.84***</b>	[1.94, 7.58]	<b>3.58***</b>	[1.80, 7.14]
School commitment			<b>1.55*</b>	[1.01, 2.38]	<b>1.60*</b>	[1.04, 2.45]			<b>2.20**</b>	[1.31, 3.67]	<b>2.27**</b>	[1.35, 3.82]
<b>Model 3: protective factors</b>												
Employment					1.33	[0.84, 2.09]					1.19	[0.68, 2.10]
Home support					0.71	[0.46, 1.09]					<b>0.52*</b>	[0.30, 0.90]
Mentorship					<b>1.55*</b>	[1.00, 2.40]					0.98	[0.58, 1.67]
Self-efficacy					1.12	[0.73, 1.72]					1.07	[0.74, 1.81]

Note. \* p < .05, \*\* p < .01, \*\*\* p < .001. OR = odds ratios, CI = confidence interval.

## **Substance Use Frequency Multivariate Findings**

Multivariate findings of the full ordinal logistic regression model results for both dependent variables measuring frequency of substance use in the past year are shown in Table 4. Similar to the previous models, each model controlled for sociodemographic characteristics (race/ethnicity and gender), then all other variables were entered in blocks of variables groups (risk factors and protective factors). Results are presented for each step of analysis for both frequency of alcohol use and marijuana use. The size of effects for the current model should be interpreted with care as small cell sizes for some of the variables affected the stability of parameters.

When examining the different frequency of use levels, it can be stated that the findings are associated evenly across the levels (e.g. youth are of equal likelihood of falling in the low use category, moderate use category, or high use category based upon the desired characteristic) as compared to the no use category. In regard to the frequency of alcohol use within the past year, ranging from no use to high use, several variables were significantly associated with the frequency of alcohol use: race/ethnicity, gender, peer substance use, low levels of school commitment, and having a dependable mentor. At each level of analysis, both gender and race/ethnicity are significantly associated with the frequency of alcohol use. The odds of high alcohol use versus the three lower categories (no use, low use, and moderate use) combined is 1.59 ( $p < 0.05$ ) times higher for youth identifying as white/Caucasian compared to non-whites, holding the other variables in the model constant. For males, the odds of high alcohol use versus the three lower categories combined is 2.24 ( $p < 0.001$ ) times higher compared to females, while holding the other variables constant. In the second block of analysis,

examining risk factors while controlling for sociodemographic characteristics, as opposed to the other three categories youth with substance using peers are 3.26 ( $p < 0.001$ ) times more likely to use alcohol at the highest level, while youth with lowered levels of school commitment are 1.55 ( $p < 0.05$ ) times more likely to use alcohol at the highest level as well. In the final model, examining the impact of protective factors while controlling for sociodemographic characteristics and risk factors, youth with substance using peers (OR=3.09,  $p < 0.001$ ) and youth with low levels of school commitment (OR=1.60,  $p < 0.05$ ) are still at an increased odds of using alcohol at the highest level in comparison to the other combined three levels of use. Although mentorship was originally hypothesized to act as a protective factor, youth reporting a supportive mentor in their lives are 1.55 ( $p < 0.05$ ) times more likely to use alcohol at the highest use as compared to the combined other three levels as use, while holding all other variables constant.

**Table 5.**  
Differences in Predicted Probability of Alcohol Use Frequency

Predictors	No Use	Low Use	Moderate Use	High Use
<b>Demographics</b>				
Male	<b>-0.159***</b>	0.016	<b>0.06***</b>	<b>0.083**</b>
White	<b>-0.091*</b>	0.009	<b>0.034*</b>	<b>0.047*</b>
<b>Risk factors</b>				
Physically abused	0.015	-0.002	-0.006	-0.008
Emotionally abused	0.023	-0.002	-0.009	-0.012
Sexually abused	-0.013	0.001	0.005	0.007
Abuse severity (reference is no abuse)				
Low Severity	0.001	-0.0002	-0.0004	-0.0006
Moderate Severity	-0.044	0.005	0.016	0.022
Severe/Extreme Severity	-0.057	0.005	0.021	0.03
Parental substance use	-0.082	0.008	0.031	0.043
Depression severity	-0.001	0.0001	0.0004	0.0006
Peer substance use	<b>-0.222***</b>	0.022	<b>0.084***</b>	<b>0.115***</b>
School commitment	-0.092	0.009	0.035	0.048
<b>Protective factors</b>				
Employment ( $n = 210$ )	-0.558	0.006	0.021	0.029
Home support ( $n = 149$ )	0.068	-0.007	-0.026	-0.035
Mentorship ( $n = 189$ )	-0.086	0.009	0.033	0.045
High self-efficacy ( $n = 179$ )	-0.022	0.002	0.008	0.012

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Estimates are average marginal effects, or the difference in marginal predicted probabilities for a discrete change in the covariates (e.g., for school commitment, they represent the average change in margins between specifying youth with high school commitment and youth with low school commitment).

Table 5 displays average marginal effects for all of the possible discrete changes on covariates, at observed levels of all of the other covariates for frequency of alcohol use. For example, holding all other covariates the same, specifying that each youth with low levels of school commitment resulted in a predictive margin for high frequency of alcohol use that was 0.05 greater on average than the predictive margin obtained when specifying youth with higher levels of school commitment (0.16 vs. 0.11). Notably, substance using peers increases the likelihood of using alcohol at a high frequency by 11.5 percentage points and of low frequency by 2.2 percentage points.

The odds of youth using marijuana at the highest level of use as compared to the combined three levels of use is significantly predicted by gender at each level of analysis within the models, while holding all other variables constant. In keeping with the prediction of youth using marijuana at the highest level of frequency, males are 2.17 ( $p < 0.05$ ) times more likely to use at high levels as compared to females while holding all other variables constant. In the second block of analysis, examining risk factors while controlling for sociodemographic characteristics, youth with substance using peers are 3.84 ( $p < 0.001$ ) times more likely to use at the highest level of frequency, while youth with lowered levels of school commitment are 2.20 ( $p < 0.01$ ) times more likely to use at the highest level of frequency. In the final model, examining the impact of protective factors while controlling for sociodemographic characteristics and risk factors, youth with substance using peers (OR = 3.58,  $p < 0.001$ ) and youth with low levels of school commitment (OR = 2.27,  $p < 0.01$ ) are still at an increased odds of using marijuana at the highest level of frequency as compared to the combined three other levels of use. Unlike alcohol use frequency, one protective factor is significantly associated with a reduction in

the odds of falling within a highest level of marijuana use as compared to the combined other three use levels. Youth with high levels of home support are 0.52 ( $p < 0.05$ ) times less likely to use at the highest frequency as compared to the combined three levels of use when holding all other variables constant.

**Table 6.**  
Differences in Predicted Probability of Marijuana Use Frequency

Predictors	No Use	Low Use	Moderate Use	High Use
<b>Demographics</b>				
Male	<b>-0.136**</b>	<b>0.018*</b>	<b>0.019*</b>	<b>0.098**</b>
White	-0.046	0.006	0.007	0.033
<b>Risk factors</b>				
Physically abused	0.005	-0.001	-0.001	-0.003
Emotionally abused	0.065	-0.009	-0.009	-0.047
Sexually abused	-0.006	0.001	0.0008	0.004
Abuse severity (reference is no abuse)				
Low Severity	-0.034	0.005	0.005	0.023
Moderate Severity	-0.127	0.016	0.018	0.093
Severe/Extreme Severity	-0.081	0.011	0.012	0.057
Parental substance use	-0.109	0.015	0.016	0.079
Depression severity	-0.002	0.000	0.000	0.002
Peer substance use	<b>-0.223***</b>	<b>0.03***</b>	<b>0.032**</b>	<b>0.161***</b>
School commitment	<b>-0.143***</b>	<b>0.019**</b>	<b>0.021**</b>	<b>0.104**</b>
<b>Protective factors</b>				
Employment ( $n = 210$ )	-0.031	0.004	0.004	0.022
Home support ( $n = 149$ )	<b>0.114*</b>	<b>-0.015*</b>	<b>-0.016*</b>	<b>-0.082*</b>
Mentorship ( $n = 189$ )	0.003	-0.000	-0.000	-0.002
High self-efficacy ( $n = 179$ )	-0.012	0.002	0.002	0.009

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Estimates are average marginal effects, or the difference in marginal predicted probabilities for a discrete change in the covariates (e.g., for parental substance use, they represent the average change in margins between specifying that a youth did not have substance using parents and that a youth did have substance using parents).

Table 6 displays average marginal effects for all of the possible discrete changes on covariates, at observed levels of all of the other covariates for frequency of marijuana use. For example, holding all other covariates the same, specifying that each youth with substance using peers resulted in a predictive margin for high frequency of marijuana use that was 0.16 greater on average than the predictive margin obtained when specifying youth without substance using peers (0.22 vs. 0.06). Notably, low levels of school



commitment increases the likelihood of using marijuana at a high frequency by 10.4 percentage points and of low frequency by 1.9 percentage points.

## DISCUSSION

The present study employed data from the Mental Health Service Use of Youth Leaving Foster Care (VOYAGES) to explore how the balance of risk and protective factors, or the phenomenon of resilience, relate to substance use among older adolescents in the foster care system. The study further examined the variation in alcohol and marijuana use and frequency by baseline sociodemographic and psychosocial variables. Particular attention was paid to the role that abuse type and severity may play in engagement of substance use and the frequency of use during late adolescence and early adulthood. The study reveals an intricate picture of substance use behaviors among foster youth that may reflect the troublesome and burdensome experiences many have faced within the foster care system.

Findings revealed that over 66% of the foster care adolescents interviewed had engaged in substance use within the past year, with about 61% reporting alcohol use and about 30% reporting marijuana use. In comparison to adolescents in the general population, these findings indicate that adolescents in the foster care system use alcohol and marijuana at higher rates (SAMHSA, 2005; Thompson & Auslander, 2007). These findings suggest that substance use, including alcohol and marijuana, is a significant and poignant occurrence in the lives of foster care involved adolescents. Moreover, these findings are in consensus with previous empirical evidence that has documented risk of substance use among foster care adolescents and those involved with child welfare

services (Aarons et al., 2001; Barn & Tan, 2015; Braciszewski & Stout, 2012; SAMHSA, 2005; Thompson & Auslander, 2007; Vaughn et al., 2007).

The examination of baseline risk and protective factors on subsequent adolescent substance use and level of use in a longitudinal cohort sample lays the foundation needed to elucidate substance use behaviors and experiences of foster care system involved adolescents in the United States and to provide a foundation on which future research can examine substance use from a longitudinal perspective. Returning to the study hypotheses, abuse types and abuse severity are not significantly associated with alcohol or marijuana use. It was hypothesized that both variables would significantly influence the likelihood of an adolescent in the foster care system to engage in higher levels of alcohol and marijuana use, the present study failed to produce significant results, thus not supporting the first hypothesis. Although it is well documented in the literature that maltreatment directly impacts an individual's substance use during adolescence and adulthood, there have been mixed findings regarding the impact of abuse on subsequent substance use within child welfare and foster care samples (Aarons et al., 2008; Pilowsky & Wu, 2006; Vaughn et al., 2007; Wall & Kohl, 2007). These non-significant findings may allude to the overall cumulative disadvantage youth in the foster care system may face, rather than the individual impact of one negative life experience such as abuse.

Regarding the second research question, it was hypothesized that abuse, severity of abuse, parent and peer substance, depression, and lowered school commitment will increase the likelihood of substance use. Additionally, it was hypothesized that the following variables will provide a buffer against the many risks and difficulties to reduce the likelihood of substance use: employment, heightened levels of familial support,

dependable mentorship, and self-efficacy. In a bivariate context, only peer substance use was significantly associated with alcohol use. Although once the full model (sociodemographic, risk, and protective factors) was examined, being male is no longer significant once the risk and protective factors are included. Youth with substance using peers was significantly associated with an increased odds in alcohol use, however a decrease in odds was illuminated once protective factors were included.

Unlike alcohol use, a number of risk factors were significantly associated with marijuana use in a bivariate context. Being male, having substance using parents, having substance using peers, and having lowered levels of school commitment significantly increased the odds of engaging in marijuana use. Within the full logistic regression model, substance using parents is no longer significantly associated with marijuana use, although being male, substance using peers, and lowered levels of school commitment continued to increase the odds of use. When examining the frequency of alcohol use, additional risk factors emerge as significant as compared to simply alcohol use.

Identifying as white/Caucasian, being male, having substance using peers, and lower levels of school commitment significantly increase the odds of using alcohol at higher frequencies. When examining the frequency of marijuana use, being male, having substance using peers, and lower levels of school commitment increase the odds of using marijuana at higher frequencies. Although these findings differ from use to frequency of use, these differences may indicate that some adolescents are already at an increased risk of engaging in substance use, but furthermore, a number of those adolescents may engage in substance use at higher frequencies. These findings may allude to the need for more personalized care for these vulnerable adolescents who may not only engage in substance

use, but also use substances at heightened frequencies which may lead to the development of a substance use disorder later in life. Overall, the second hypothesis regarding risk factors was only partially supported with peer substance use and lower levels of school commitment significantly increased the odds of substance use and frequency of use.

In line with past research, it was hypothesized that the prevalence of substance use and frequency of use will be higher in adolescent males and adolescents who identify as white/Caucasian. The findings provide only limited support of the included protective factors and their association with substance use and frequency of use. Although there were not any protective factors significantly associated with alcohol use, the slight reduction in the odds of engaging in alcohol use once both risk and protective factors are included, provides knowledge that the inclusion of protective factors does in fact provide a limited buffer against alcohol use. Having a supportive network at home likely provided a buffer against marijuana use in both bivariate and multivariate models.

When examining the frequency of alcohol use, a surprising and puzzling finding was illuminated. Of the individuals reporting a dependable and supportive mentor as compared to those without a mentor, face an increased odds of using alcohol at higher frequencies. This finding is novel and not in consensus with previously reported literature surrounding foster care system involved adolescents. These findings could be due to the limited number of adolescents who use have a dependable mentor and engage in substance use or the notion that not all foster care youth are generalizable. Although these findings seem relatively odd given the well known successes and implementations of mentorship programs for child welfare and foster care involved youth, they illuminate

the need for additional research to examine the association between mentorship and substance use behaviors. These findings could be due, in part to, the definition of mentorship used in the study and the youth's understanding of what a mentor truly is in terms of guidance and care. For example, it is possible that the youth in the present study considered slightly older peers, who may have been substance using, as their mentors, based on the item used to ascertain mentorship.

Prior research has suggested that the extent to which an adolescent feels supported and cared for appears to influence substance use and the frequency of use (Barn & Tan, 2015; Cheng & Lo, 2010; Guibord, Bell, Romano, & Rouillard, 2011; Kohlenberg et al., 2002; Masten, 2004; Masten & Reed, 2002; Traube, James, Zhang, & Landsverk, 2012; Wall & Kohl, 2007). Additionally, lower levels of family support and attachment have been found to increase the odds of using marijuana for adolescents involved in the foster care system (Kohlenberg et al., 2002). Similar to the marijuana use findings, those with a supportive network at home are at a reduced odds of using marijuana at a higher frequency. Although limited, these findings illuminate the need for supportive systems to be in place for adolescents involved in the foster care system to successfully navigate away from substance using behaviors. Given only partial support of hypothesis three, future research should continue to explore and examine possible protective factors that may act as a buffer against adolescent substance use, as well as, reexamine mentorship as a possible barrier to resilience. Additionally, one must consider whether the cumulative negative experiences an individual faces may outweigh the possible positive or resilient aspects of their lives.

In synopsis, findings regarding risk and protective factors for alcohol and marijuana use for this sample were relatively limited. At the bivariate level, findings were not in consensus with previous studies conducted with foster care and child welfare samples. Many of the hypothesized risk factors failed to provide significance in predicting substance use and frequency of use, while only a couple protective factors provide significance. With regard to sociodemographic characteristics, being male and identifying as white/Caucasian significantly increases an adolescent's likelihood of engaging in either alcohol or marijuana and the likelihood of engaging in higher frequencies of use. With regard to overall substance use and frequency of substance use, multivariate findings were limited in examining the balance of risk and protective factors in order to understand adolescent substance use behaviors. The current study found that key experiences of peer substance use and lowered levels of school commitment significantly increase the likelihood of an adolescent in the foster care system using alcohol or marijuana, as well increase the frequency of their use. In addition to peer substance use and low school commitment, having a dependable mentor actually significantly increased the likelihood of an individual engaging in higher frequencies of alcohol use. Previous research has consistently found lower levels of educational attainment and lower levels of school commitment among foster care involved youth (Barciszewski & Stout, 2012; Barn & Tan, 2015; Courtney & Dworsky, 2006; Courtney et al., 2007).

These findings are worthy of discussion given that this study followed similar methods to investigate risk and protective factors for alcohol and marijuana use of child-welfare system and foster care system involved youth as a couple of other studies (Barn

& Tan, 2015; Traube et al., 2012; Wall & Kohl, 2007) that provided mixed and limited findings. It is presumed that given the importance of this developmental time period, late adolescence into early adulthood, and the numerous events that occur for this population during the study period, limited value may be assigned to baseline risk and protective factors in predicting engagement in substance use behaviors over a 24 month period of time during an adolescent's life. Even though the current study yielded limited findings, there are still many important takeaways to be considered. While youth placed in out-of-home care, such as foster care, are at an elevated risk for substance use and negative life outcomes, variability exists within this vulnerable population; not all foster youth go on to engage in substance use. Consequently, it is important to identify the subset of adolescents who are at greater risk of engaging in substance use and those who are most likely to benefit from prevention and intervention programs to ensure resources are used effectively and benefits are maximized.

### **Strengths and Limitations**

Although the present study makes meaningful strides to improve the understanding of risk and protective factors associated with adolescent substance use behaviors, the results of this study should be interpreted in light of its limitations. First, the study relies on self-reported activity of substance use and frequency of substance use, which could have resulted in the over- or under-reporting of use since the youth may feel pressured or hesitant to report truthfully due to being in the custody of the state (Tourangeau & Smith, 1996; Traube et al., 2012). Although the child welfare system in Missouri is thought to be comparable to that of other states within the United States, the sample may not be representative of all youth in the foster care system, nor does it

provide the capability to examine the differences between non-foster care involved youth. However, past scholars have indicated that samples composed of high risk individuals are still vital and wildly necessary to increase our knowledge base on the influence of both positive and negative life outcomes.

Secondly, alcohol and marijuana use were dichotomously measured within the past year while not accounting for prior use. In regard to the frequency of use, the current study was limited to the measures and operationalizations originally included in the survey, with much of the measures varying in distance between levels of use (e.g., one to five experiences indicating low use, six to nineteen experiences indicating moderate use, and 20+ experiences indicating high use). Furthermore, the measurement of a number of risk and protective factors were subject to difficulties, such as reliance on items and measures without known psychometric properties and the use of single or limited items to measure crucial constructs.

Thirdly, while official records of child and adolescent maltreatment would have provided additional data regarding the type and severity of abuse, the current study utilizes retrospective, self-report endorsements of abuse experiences. Although the combination of self-report and official records would have been the optimal condition to examine the relationship between abuse and substance use behaviors, a large number of youth reported experiences of abuse, possibly reducing the ability to provide an in-depth comparison between abused and non-abused youth. Finally, a number of factors such as depression severity, level of school commitment, and level of family support can vary tremendously over the course of an adolescent's life into early adulthood. In regard to



the relatively weak effects, one may take into consideration the temporal distance of two years between the baseline and final follow-up in the study to provide explanation.

Finally, in an ideal study, there would be a true counterfactual group: researchers would compare youth in foster care to those not in foster care, and ascertain the levels of maltreatment among each group. One could then compare the effects of maltreatment, separate from the foster care system, on substance use, relative to risk and protective factors. This would provide a better understanding to the needs of maltreated youth in the foster care system, thus informing policy initiatives to ensure efficient prevention and intervention programs are being implemented.

### **Implications and Future Research**

The key findings of the current study include significant associations between baseline peer substance use, lowered levels of school commitment, mentorship, and familial support with later adolescent substance use of adolescents in the foster care system. Overall, the existence of numerous individual risk factors far outweigh the potential of protective factors buffering against subsequent substance use (see Sameroff & Chandler, 1975; Sameroff et al., 1993). As demonstrated in the literature review, it is evident that risk factors tend to compound within foster care youth. The often defining difference in high-risk and lower-risk youth is the presence of multiple adversities in their lives (Raviv, Taussig, Culhane, & Garrido, 2010). By considering the cumulative effects of the risk and protective factors, researchers may better understand the characteristics of those high-risk vulnerable youth (Appleyard, Egeland, van Dulmen, Sroufe, 2005; Gutman, Sameroff, & Cole, 2003; Masten & Wright, 1998; Sameroff, Seifer, Baldwin, Baldwin; 1993). When looking at cumulative risk indices (the summation of the number

of risk factors that are present), youth with high cumulative risk scores encounter worse outcomes as compared to those with lower cumulative risk scores, regardless of the individual risk factors that are included in the scores (Sameroff et al., 1993). With this in mind the foster care system, although well-intentioned, may prevent some individuals from successfully navigating through adolescence and early adulthood due to the numerous adverse experiences many youth face; it may add on to the cumulative risk these adolescents face leading to subsequent substance use. Given the high prevalence of substance use among those placed in the care of the foster care system, prevention efforts for this population requires an improved understanding of psychosocial risk and protective factors.

Despite the disproportionate negative and traumatic events in the lives of foster care involved youth, relatively few studies have addressed substance use outcomes in this already susceptible population. Generally, the initiation and continuation of substance use exists throughout adolescence, with use peaking in late adolescence and early adulthood (Braciszewski & Stout, 2012). In addition to the already high strain that comes with being an adolescent, many youth involved in the foster care system have compounding difficulties in life (e.g., maltreatment, household substance use, mental illness) that are known to increase the likelihood of subsequent substance use (Aarons et al., 2008; Braciszewski & Stout, 2012; Barth, 1990; Dennis, 2004; Elze, Auslander, McMillen, Edmond, & Thompson, 2001; Groze, McMillen, & Haines-Simeon, 1993; Perrin, Simms, Dubowitz, & Szilagyi, 2000; Simms, Dubowitz, & Szilagyi, 2000; Thompson & Auslander, 2007; Traube, James, Zhang, & Landsverk, 2012). With the limited effects of protective factors, the well-intentioned facets of child welfare services,

such as the foster care system, may not provide the fundamental resources needed to buffer the cumulative risk and adversity these vulnerable populations are exposed to.

In the face of these limitations, given the paucity of understanding regarding adolescents in the foster care system, the presence of longitudinal or cross-sectional findings in this area nonetheless contribute to the overall understanding of substance use behaviors for foster care system involved youth. Future studies should continue to focus on the relationship between negative life experiences, resilience to overcome adversity, and subsequent substance use behaviors. Measuring the entirety of compounding risks may provide a more comprehensive model and give rise to a better understanding of potential protective factors. By utilizing a more comprehensive model, future research may be able to find more interesting links between disadvantage and substance use outcomes. Through the cumulative examination of multiple risk factors simultaneously rather than indentifying the mechanisms through which individual risk factors operate, a better understanding of the association between high-risk adolescents and subsequent substance use may be illuminated. Rather than focusing on a problem-oriented approach, encouraging positive skills that may promote adolescent resilience in the face of adversity has the capability to protect or “shield” susceptible youth from negative long-term outcomes (Pears, Kim, & Fisher, 2016; Spoth, Gyll, & Shin, 2009). Overall, many facets of the foster care system may not have the capabilities to establish a barrier against negative life outcomes in those who become custody of the state, but with additional research, there is the potential to provide life-altering help this vulnerable population deserves, particularly by identifying and then promoting protective factors that buffer adverse outcomes for these youth.

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