

DEVELOPMENTAL DISRUPTIONS AND SUBSTANCE USE
IN AN EMERGING ADULT SAMPLE

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Abstract

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Recent substance use reports indicate a rise in use-related deaths. Emerging adults are identified as the most prevalent users of substances when compared to other age groups. Current intervention methods are not universally effective, with relapse rates varying by treatment model. The poor efficacy of interventions may be due to a lack of models using a developmental focus. For example, previous research highlights the influence of adverse childhood experiences (ACEs) on negative adult outcomes such as excessive substance use. ACEs may trigger a cascade of adaptational failures, disrupting attachment bonds between caregiver and child, and later influencing the development of emotion regulation skills. Therefore, it can be argued that treatment should focus on such stage-salient developmental tasks.

The present study examined the relationship between adverse childhood experiences and substance use in a sample of 182 emerging adults. Participants accessed the study online via SurveyMonkey. It was expected that higher ACE scores would be associated with greater substance use (frequency and number of substances used). Additionally, it was hypothesized that attachment quality and emotion regulation would serve as possible developmental mechanisms underlying this relationship. The current

study also explored the possible association between ACE scores and the specific emotion regulation strategies of expression and suppression.

Consistent with previous research, male participants reported higher levels of attachment avoidance, substance use frequency, and number of substances used than females. ACE scores were higher for persons of color, and they utilized expressive suppression to regulate emotions more than White/European-American participants did. Surprisingly, there was no relationship between ACE scores and substance use outcomes in the current sample. However, higher ACE scores were related to higher use of painkillers (e.g., OxyContin, Percocet, Vicodin, etc.) and sedatives (e.g., Xanax, Valium, sleeping pills, etc.). The current study is one of the first to examine separate and specific substances beyond alcohol, tobacco, and marijuana in an emerging adult sample.

To our knowledge, this is also one of the first studies to examine ACE scores in relation to specific emotion regulation strategies, finding that higher cumulative ACE scores predicted the use of expressive suppression. Though mediation analyses could not be performed due to sample size and lack of significant relationships between ACEs and substance use outcomes, results highlight the links between ACEs, adult emotion regulation and use of specific substances. Specifically, participants who reported higher ACE scores were more likely to utilize expressive suppression to regulate emotions and to more frequently use painkillers and sedatives. Future research should continue to explore developmental markers as foci for substance use intervention to support improvements in current treatment models.

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Introduction

Substance abuse costs the nation more than \$740 billion annually, in terms of societal crime, loss of work productivity, and health care (National Institute on Drug Abuse [NIDA], 2017a). In 2016, more than 64,000 individuals died as a result of drug overdose, with rates of illicit and opioid drug related deaths doubling in the last decade (NIDA, 2017b). Recent usage reports indicate that emerging adults are the most prevalent users of substances when compared to other age groups, suggesting that research is needed to determine factors that may prevent such use (Substance Abuse and Mental Health Services Administration [SAMHSA], 2015).

Emerging adulthood is characterized by increased sensation seeking and a desire for intense and unique experiences, lending itself to being a period of increased substance use (Arnett, 1994b, 2005). In addition to having the highest rate of alcohol consumption within a given thirty-day period, emerging adults are the age group most likely to use illicit drugs, cannabis, and cigarettes (SAMHSA, 2015). Increased substance use is linked to an array of physical and mental health outcomes that make the current usage reports concerning (Anda et al., 2002; Dube et al., 2003; Kurt, 2015; Liu, Yang, Shi, Liu, & Wang, 2016). Previous research has highlighted an association between academic achievement and substance use, with rates of substance use influencing the likelihood of being injured, missing class, obtaining poor grades, dropping out of school, engaging in risky sexual activity, and criminal justice involvement (Lynskey & Hall, 2000; Townsend, Flisher, & King, 2007; Wechsler, Lee, Kuo, & Lee, 2000). Given the overall

association between emerging adulthood and increased rates of substance use, it is essential that research examine possible risk factors for non-normative substance use in early adulthood.

The field of Developmental Psychopathology (DP) investigates behavior as an outcome of developmental adaptations (Sroufe, 1997). Pathology (including non-normative substance use) may be viewed as an outcome of adaptational failures in stage-salient developmental tasks (e.g., attachment security and emotion regulation). Failures in these developmental domains are strong predictors of pathology and impact one another simultaneously and longitudinally in a developmental cascade (Masten & Cicchetti, 2010; Sroufe & Rutter, 1984). Low-level substance use is normative during adolescence and early adulthood; however, excessive usage that impairs daily functioning is not (Brown, Tomilson, & Winward, 2017; Petraitis, Flay, & Miller, 1995). Positive developmental environments (e.g., having basic needs met, positive parent-child interaction, and caregivers high in warmth and high in discipline) in the first decade of life help to facilitate task development. Conversely, adverse childhood experiences during this crucial developmental time may begin the cascade of adaptational failures (Sroufe, 1997).

Adverse childhood experiences may influence negative adult outcomes including alcohol or other drug use related problems (Dodge et al., 2009; Masten et al., 2005). Researchers have examined individual childhood risk factors related to later substance use in adulthood. Findings have highlighted that, among other variables, minority ethnicity, low socioeconomic status (SES), family substance abuse history, parent

psychopathology, and a history of abuse or neglect are linked to the later development of substance use (Buu et al., 2009; Chassin, Flora, King, & Baker, 2004; Clark, Cornelius, Kirisci, & Tarter, 2005; Dong, Anda, Dube, Giles, & Felitti, 2003; Hayatbakhsh et al., 2007; Stone, Becker, Huber, & Catalano, 2012; Tarter, Kirisci, Habeych, Reynolds, & Vanyukov, 2004). These factors have been examined individually to understand influences on substance use; however, further research is needed to examine the impact of cumulative risks on the development of substance use behaviors.

The theory of cumulative risk focuses on the overall number of risk factors a person experiences rather than any specific individual risk (Nair, Schuler, Black, Kettinger, & Harrington, 2003). This accumulation perspective posits that as the number of risks increase, so does the likelihood of a negative impact on an individual's development (Appleyard, Egeland, van Dulmen, & Sroufe, 2005). In an examination of adverse childhood experiences (ACEs), Felitti et al. (1998) explored the impact of cumulative risk on health outcomes. Results highlighted an association between increased ACEs, such as child maltreatment and household dysfunction, and an array of negative health outcomes such as heart disease, cancer, liver disease, and lung disease.

In addition to these health complications, ACEs have become an area of interest in developmental research when examining substance use. The field of research surrounding ACEs and substance use is growing, with more support for ACEs predicting substance use in later adulthood (Allem, Soto, Baezconde-Garbanati, & Unger, 2015; Anda et al., 2002; Brown & Shillington, 2017; Cho et al., 2015; Dube et al., 2003; Mersky, Topitzes, & Reynolds, 2013). Of particular concern is the disruption of early

stage-salient developmental tasks (such as attachment and emotion regulation) in an environment of increased ACEs. Though research has highlighted the association between increased ACEs and substance use, investigation of the possible mediating factors such as stage-salient task disruption is lacking.

Through examination of attachment styles, researchers have been able to further understand factors linked to substance use in college students. Previous research suggests that insecurely attached emerging adults are more likely to engage in risk taking behavior (Niyonsenga et al., 2012). These individuals are at a heightened risk for using substances in early adulthood when compared to those with secure attachments (Kassel, Wardle, & Roberts, 2007; Vungkhanching, Sher, Jackson, & Parra, 2004). These results suggest that a secure attachment may act as a protective factor against other influences that would individually increase the risk of substance use.

Secure attachments, stemming from authoritative parenting styles, which are high in support and discipline, have been shown to foster more successful emotion regulation skills (Rodriguez, Tucker, & Palmer, 2016). Conversely, insecure attachment may lead to dysregulated emotions. Thus, poor emotion regulation has been researched along with attachment insecurity as a risk factor predicting substance use development. Researchers have examined how substance use in college is used as a stress coping mechanism (Aurora & Klanecky, 2016; Mckee, Hinson, Wall, & Spriel, 1998; Wong et al., 2013); however, specific research examining emotion regulation strategies and their relation to substance use behaviors is limited. Extant studies suggest that use of substances such as alcohol and cigarettes may act as a regulation strategy to alter emotional states (Brandon,

1994; Gross, 2015; Khantzian, 1985; Stewart, 1996). The examination of regulation strategies within emerging adult samples focuses primarily on alcohol consumption. Since most emerging adults use more than one substance, research examining multiple substances is needed. The current study included multiple types of substances, including illicit drugs (e.g., cocaine, methamphetamines, MDMA or Ecstasy, LSD, and inhalants), alcohol, cannabis, and tobacco products (e.g., cigarettes, e-cigarettes, and hookah).

The current study sought to expand on the literature by examining purported underlying mechanisms (attachment and emotion regulation strategies) and their association with substance use behaviors in emerging adults. This study is one of the first to examine possible mediating variables in the relationship between ACEs and substance use in emerging adulthood. Although research has examined substance use and each proposed mechanism individually, exploration of these variables as possible mitigating or protective factors is less common.

Emerging adults in college have the highest prevalence of alcohol use disorder (Kelly et al., 2013; Wu, Pilowsky, Schlenger, & Hasin, 2007). Historically, the culture of stigma surrounding substance use means many will not seek treatment, and when they do, they often do not receive evidence-based treatments (Miller, Sorensen, Selzer, & Brigham, 2006). Thus, although substance use rates are high for emerging adults, many are unlikely to receive early intervention or treatment.

Treatment and intervention measures for emerging adult substance use are typically informal, with individuals seeking assistance through colleagues and friends (Miller et al., 2006); however, motivational interviewing (MI) is a face-to-face treatment

model that is supported by research. Though countless evaluations suggest that MI is efficacious in decreasing substance use, further investigation highlights its limitations. There does appear to be harm reduction, but there is no research to suggest permanent long-term change. This may be due to MI's lack of focus on addressing underlying developmental mechanisms that may perpetuate substance use behaviors.

In contrast, the Community Reinforcement Approach (CRA) examines substance use holistically. It focuses not only on the individual, but the environment and context in which the substance use occurs. CRA recognizes that each individual is different and is tailored to each person. Researchers examining this holistic approach deemed the treatment effective among young adult substance users; however, implementation and evaluation of the treatment were carried out by its developers, which highlights a potential flaw (Miller, Meyers, & Hiller-Sturmhofel, 1999; Roozen, Boulogne, van Tulder, van den Brink, Jong, & Kerkhof, 2004). In spite of this fault, the developmental focus of this model may account for its efficacy (Godley, Garner, Smith, Meyers, & Godley, 2011; Godley et al., 2017).

In regard to development, a newer treatment approach called Attachment, Self-Regulation, and Competency (ARC) focuses on stage-salient developmental tasks such as attachment and emotion regulation when implementing interventions (Cook et al., 2000). This treatment approach has limited research examining its efficacy in substance use reduction; however, it does demonstrate symptom reduction in various psychological outcomes (e.g., reductions in PTSD, internalizing, and externalizing symptoms; Hodgdon et al., 2013) and pilot study results highlight the benefit of focusing on these

developmental tasks in interventions by strengthening skills (e.g., affect knowledge, expression, and modulation) that may enhance resilient outcomes (Kinniburgh, Blaustein, Spinazzola, & van der Kolk, 2005). The ARC model uses attachment building as the foundation of intervention (Kinniburgh et al., 2005).

Likewise, the short-term success found for MI may be a result of the authoritative relationship formed between client and therapist, which can resemble a secure attachment and may help modify negative cognitive representations of attachment relationships. This relationship may foster a more secure internal working model, which may additionally impact emotion regulation capacity. Identifying these underlying mechanisms as potential contributors to substance use may provide targets for intervention and prevention, promote long-lasting developmental change, and potentiate positive developmental cascades for middle and late adulthood. Further examination of these stage-salient tasks and substance use may provide support to refine commonly used treatment approaches, such as MI and CRA, by incorporating facets of the ARC model. Specifically, focusing on the formation of corrective attachment bonds and autonomous emotion regulation may be particularly effective.

Literature Review

Emerging Adulthood

Emerging adulthood, categorized as the period between ages 18 to 26, is a current period of interest in developmental research. It is viewed as a time of accelerated transitions, with new social systems and rules governing interactions that differ from previous developmental time periods (Stone et al., 2012). During this time, individuals find themselves in the “in-between,” neither an adolescent nor an adult. While attempting to discover their identity, emerging adults make changes to their environment in terms of peers, partners, employment, and educational status (Arnett, 2005). During this period, many individuals are not yet committed to the standards of adulthood, yet they embrace the freedoms that come with no longer being an adolescent. Due to their lack of commitment, many emerging adults engage in risk taking behavior (e.g., hazardous driving, substance use, and unsafe sexual activity) that may not be deemed acceptable in adulthood (Arnett, 1994a, 1998, 2000, 2005).

Risk Factors and Substance Use

Substance use in adulthood is associated with an array of risk factors from biology to environment (i.e., genetics, race/ethnicity, socioeconomic status (SES), family substance abuse history, parent psychopathology, history of abuse or neglect; Buu et al., 2009; Chassin et al., 2004; Clark et al., 2005; Dong et al., 2003; Hayatbakhsh et al., 2007; Stone et al., 2012; Tarter et al., 2004). These risk factors have been associated with increased alcohol bingeing and dependence, cannabis and nicotine use, antisocial

behavior, as well as other substance use outcomes. Typically, research examines single risk factors and their links to substance use; however, research focusing on cumulative risk factors is limited. Studies have focused on multiple maltreatment types (i.e., physical, emotional, and sexual abuse) but not on overall cumulative risk profiles from childhood as addressed by the ACE assessments (Herrenkohl et al., 2013; Rosenkranz, Muller, & Henderson, 2012).

Adverse Childhood Experiences (ACEs). Felitti et al. (1998) focused on adverse childhood experiences and medical health problems later in life. There was a linear relationship between childhood exposure to abuse or household dysfunction and health problems comprising the leading causes of death in adults. Further research highlighted the association between ACEs and negative outcomes such as increased risk of illicit drug use, alcohol dependence, and depression (Anda et al., 2002; Dube et al., 2003; Liu et al., 2016). When further examining the relationship between ACEs and substance use in youth, Brown and Shillington (2017) found that protective adult relationships mediated the relationship between ACEs and substance use. These results support the importance of examining the effects of attachment quality and adverse childhood experiences as they relate to substance use behaviors.

Growing research has provided evidence showing traumatic early childhood experiences and insecure attachment to be interrelated yet independent risk factors for substance use development (Fletcher, Nutton, & Brend, 2015). Jaeger, Hahn and Weinraub (2000) examined attachment quality in daughters of alcoholic fathers, discovering a lower level of attachment security in the daughters of alcoholics compared

to daughters of nonalcoholics. Further research on family alcohol history found that an insecure attachment style is a risk factor for later substance use in early adulthood (Vungkhanching et al., 2004).

Attachment

Attachment is defined as an emotional bond formed between one person and another (Ainsworth & Bell, 1970). John Bowlby (1969) emphasized the innate human response by which a child becomes attached to a caregiver. He postulated that after birth, it is biologically necessary for the infant to be within close proximity, both physically and emotionally, to a caregiver in order to form a secure base for attachment (Bowlby, 1988). Those with a secure base for attachment will use this to explore their environment, ultimately creating a template for their internal working model (IWM; Ainsworth, 1982; Ainsworth, 1989; Bretherton, 1985; Mikulincer & Shaver, 2007). This cognitive model acts as a mental representation of the child-caregiver relationship and is developed by the quality of care received, creating a framework from which to view future social relationships.

Ainsworth, Blehar, Waters, and Wall (1978) refined Bowlby's theories through developing attachment types: secure, anxious-resistant/ambivalent, and anxious-avoidant. A child's confidence in their caregiver's physical and emotional availability can lay the foundation for attachment quality, a comfort in exploration, and effective problem solving (Bretherton, 1985). Attachment outcomes develop from a safe caregiving environment. Guided by the caregiver's own internal working model, the child can feel safe to explore without fear of vulnerability. In contrast, anxious-resistant/ambivalent

attachment is often an outcome of inconsistent caregiving. These individuals often lack an internal working model that can allow them to safely explore their environment, resulting in high levels of anxiety when subjected to an unfamiliar setting. Caregivers who are unavailable to their child, are cold, or ignore them, may foster an anxious-avoidant attachment style; this tends to result in intimacy avoidance by the child (Ainsworth et al., 1978; Bretherton, 1985).

Attachment in emerging adulthood. Bowlby argued that attachment is a basic human function of childhood. He took this theory a step further by also suggesting that this function is essential to healthy socioemotional functioning in adulthood (Bowlby, 1969). Based on previous attachment theorists, Cicchetti and Toth (1995) examined adult attachment as a progression from observed interactions in childhood to generalized internal cognitive working models of relationships. Attachment in adulthood is focused more on one's peers and romantic partners (Cicchetti & Toth, 1995).

Ainsworth (1979) highlights that the quality of sexual bonds is an indicator of attachment in adulthood. Attachment insecurities can then manifest in one's interactions with other significant adults. Individuals who are secure, avoidant, or ambivalent in their working models recount differing parent-child relationships in their youth (Shaver & Hazan, 1988). These results support the argument that perceptions of youth attachment security can continue to affect us in adulthood. Thus, individuals with insecure attachment to their caregivers may show increased attachment insecurity in adulthood (Cicchetti & Toth, 1995). Marris (1982) suggests that relationships bring meaning to human lives. A loss, or lack of relations, brings with it a sense of grief. The foundation of

adult relationships stems from the parent-child relationship in infancy. An individual's ability to love and be intimate with another may ultimately be a result of their previous relationships with their caregivers.

The IWM is theorized to be fairly consistent across time and across relationships (Berman & Sperling, 1994). As posited by Ainsworth (1982), individuals with a secure internal working model will return to homeostasis following a period of transition, whereas individuals with anxious attachment may be likely to develop social skill deficits. The combination of insecure attachment and subsequent social skill deficits may result in use of substances as individuals attempt to work through their attachment insecurity and self-medicate with substances in an attempt to regulate feelings of insecurity or loss.

Substance use and attachment. Kassel, Wardle, and Roberts (2007) investigated adult attachment security and substance use in a college population. They found insecure attachment was related to frequency of stress-related substance use (i.e., cigarettes, alcohol, and cannabis used to cope with stress).

When examining attachment in a Latina population, Niyonsenga et al. (2012) found a relationship between higher quality of attachment and lower levels of substance use. Analogous research highlighted attachment as a mediator between emotional abuse and substance use (Kanamori et al., 2016). Much of the current research defines substance use primarily by looking at alcohol consumption (e.g., McNally, Palfai, Levine, & Moore, 2003; Vungkhanching et al., 2004). While some research examines more than alcohol consumption, it usually fails to include illicit drugs beyond cannabis

(Kassel et al., 2007; Minugh & Harlow, 1994). However, it is common for an individual within the emerging adult stage to use more than one substance at a time (Shepardson & Hustad, 2016). Thus, future research must be inclusive of multiple substances when examining use by emerging adults. Further research is needed to investigate links between attachment and substance use as well as additional potential mediators, such as one's ability to regulate emotions.

Emotion Regulation

Positive psychological outcomes (e.g., higher emotion understanding, stable self-concept, strong peer relationships) are associated with attachment security. In addition to attachment security, emotion regulation is an essential part of positive socioemotional outcomes (Waters et al., 2010). Over the last few decades, the concept of emotion regulation has sparked research in various psychological fields such as Developmental, Clinical, Personality, and Health psychology (Gross, 1998). Early on, emotion regulation was examined through a psychoanalytic lens, where emotion regulation was characterized as an ego defense, used as a means to cope. More recently, emotion regulation has been conceptualized as consisting of both intrinsic (e.g., temperament) and extrinsic (e.g., caregiver-child interactions) factors (Cassidy, 1994; Thompson, 1994). Emotion regulation typically begins as the individual evaluates emotion cues, both internal and external (Gross, 1999). This process involves strategies used to control and change emotions in response to differing environmental, relational, and situational changes (Gross & John, 1995; Thompson, 1994). These emotional processes evolve over time, and can be both conscious and unconscious (Gross, 1998).

As previously suggested, caregiver responsiveness is a contributing factor in secure attachment development. This bidirectional relationship contributes to the development of emotion regulation processes (Thompson, 1994). A secure attachment between caregiver and child plays a large role in managing responses to stressful, dangerous or threatening situations. These responses are indicated by one's level of emotion reactivity and the ability to modulate emotions (Diamond, 2015). Infants depend on their caregivers for assistance when attempting to manage their emotions. For example, caregivers assist infants in maintaining and regaining a calm state (Thompson, 1994). When an infant becomes distressed, they may attempt to regulate their emotions; however, these attempts are generally ineffective and scaffolding is needed from an adult to learn effective regulation strategies (Cole, Hall, & Hajal, 2017).

Affect mirroring by the caregiver assists in scaffolding the child's ability to self-regulate (Gergely & Watson, 1996). This outsourcing of emotions to caregivers is a crucial part of the multi-level developmental process of self-regulation (Cassidy, 1994). Through facial expressions, vocalizations, and physical touch, attachment figures scaffold a child's skills in regulating their emotions. In doing so, the attachment bond is used to fine-tune the child's stress regulatory systems (Diamond, 2015). As the caregiver fosters the child's skills to regulate emotions, these skills are stored in the child's IWM, particularly as tools for coping with socio-emotionally challenging contexts, such as those often encountered by emerging adults.

A caregiver who is responsive to the child and provides mirroring of emotions will help to facilitate autonomous emotion regulation (Gergely & Watson, 1996; Waters

et al., 2010). As a child develops, they will begin to cope with frustrations and disappointments without becoming dysregulated. Strategies such as cognitive reappraisal will be employed effectively, assisting the child in maintaining a calm state (Cole et al., 2017). Children with secure attachments are able to employ regulation strategies more easily and depend on their caregivers for assistance while insecurely attached children may not use caregivers to help them cope with social contexts (Crugnola et al., 2011). For example, a caregiver-child relationship that is low in warmth means the child's needs are not met and may result in ineffective emotion regulation skills and more problematic adolescent and adult behavior, such as non-normative substance use (Kim, Stifter, Philbrook, & Teti, 2014).

Gross (1998, 1999, 2015) classifies emotion regulation strategies into two categories: antecedent-focused and response-focused. Antecedent-focused strategies refer to events prior to an emotional response, whereas response-focused strategies occur as a response to a given emotion (Gross & John, 2003). Antecedent-focused strategies include cognitive reappraisal, where one evaluates the circumstances and their significance (Cole et al., 2017). This strategy is specific to cognitive change, in which the situation or environment is transformed to alter its emotional impact. This alteration can occur through changing how one thinks about a situation or changing one's ability to manage the situational demands. This process of cognitive reappraisal is a key component of stress reduction (Gross, 1998, 1999). Research suggests that reappraisal is a positive strategy, whereas other regulation strategies (such as suppression) are viewed as unhealthy but adaptive (Aldao, 2013; Brewer, Zahniser, & Conley, 2016).

Suppression is a form of response modulation that relates to one's ability to inhibit emotional expression (Gross, 1999; Gross & John, 2003). Research suggests that emotional experiences can be indirectly suppressed through the use of substances (e.g., alcohol, cigarettes, and drugs) to alter or modify one's emotional state (Brandon, 1994; Gross, 2015; Khantzian, 1985; Stewart, 1996).

Substance use and emotion regulation. Of particular importance in the development of emotion regulation skills is one's ability to deal with stress in differing contexts (Cornelius, Kirisci, Reynolds, & Tarter, 2014; Dashora, Erdem, & Slesnick, 2011; Shedler & Block, 1990). As mentioned above, these skills are grounded in specific strategies learned in early development (Gross, 1999). Aurora and Klanecky (2016) suggest that the motives underlying substance use are of particular concern. Researchers investigated drinking motives in an emerging adult sample and found that most participants with high levels of alcohol consumption were doing so as a means to cope. This pattern of substance use can be explained through an examination of emotion regulation strategies. For example, Wong and colleagues (2013) found that participants who primarily employed a suppression strategy evidenced more problematic substance use patterns (i.e., higher rates of substance use and dependence). Thus, individuals with coping drinking motives may consume high rates of alcohol as a means of suppression. In addition to increased consumption, difficulty in understanding the emotions being felt was related to alcohol use (Dvorak, Sargent, Kilwein, Stevenson, Kuvaas, & Williams, 2014).

Emerging adulthood often involves the development of emotional stability

(Zimmerman & Iwanski, 2014). In conjunction with brain myelination and reward seeking behaviors occurring during this age range, instability in emotional understanding, stemming from disruptions in attachment bonds, may influence the use of outside sources to assist in emotion regulation and prevent emotional stability. Individuals attempt to alleviate their distress/mood state with substance use behaviors; however, many studies examining the relationship between emotion regulation and substance use focus primarily on alcohol consumption. This lack of investigation of other substances limits generalizability.

Additionally, limited research examines emotion regulation as a mediator between ACEs and substance use in the emerging adult population. In the studies that have attempted this investigation, primary focus was placed on use motives rather than emotion regulation strategies (Armeli et al., 2014; McNally et al., 2003). Though some literature suggests that coping strategies and emotion regulation strategies are related, specific regulation strategies (i.e., reappraisal and suppression) have been less frequently assessed. Therefore, the current study examined emotion regulation within the context of reappraisal and suppression strategies. Emotion regulation is investigated in this study as a mediator between ACEs and substance use, with a particular focus on these mediators' potential usefulness as treatment targets.

Treatment Models

Few treatment and intervention models for substance use are based on research evidence (Miller et al., 2006); however, motivational interviewing (MI) is a treatment model with research support (Borsari et al., 2015; Carey, 2012; Dermen & Thomas,

2011; Lundahl, Kunz, Brownell, Tollefson, & Burke, 2010; Miller & Rollnick, 2014). MI is typically brief and has three main characteristics (Lundahl et al., 2010; Carey, 2012; Miller & Rollnick, 2014). The first involves an authoritative style of counseling, which provides a non-confrontational and collaborative environment to foster discussions for change. The second involves directed conversations aimed at helping the individuals identify goals for change. For emerging adults, focus is traditionally placed on harm reduction. Lastly, MI involves supporting and strengthening an individual's own motivations for change (Carey, 2012; Miller & Rollnick, 2014).

Over the last decade, countless evaluations support MI as highly efficacious in the reduction of substance use in emerging adult samples (Dermen & Thomas, 2011; Carey, 2012; Madson, Schumacher, Baer, & Martino, 2016). Further examination, however, suggests limited generalizability to other substances (Dennhardt & Murphy, 2013). While most research evaluating MI indicates a significant reduction in substance use in the broad sense, research models are typically specific to alcohol consumption and the reduction of multiple substances has not been fully addressed (Borsari et al., 2015; Dermen & Thomas, 2011; White, Mun, Pugh, & Morgan, 2007). For example, Amaro and colleagues (2010) used a pre-post design to primarily examine MI's effectiveness for reducing alcohol use in college students. Along with a decrease in alcohol use, a decrease in cannabis and cocaine use among high frequency users (individuals who reported using a substance ten times or more in the past six months) was also found at a six-month follow-up. Though not expected as part of the initial research design, the authors of this study concluded that MI was effective in decreasing both alcohol and drug use.

Unfortunately, the researchers implied a causal relationship by using a simple pre-post design without random assignment to treatments or a comparison group. Without the inclusion of a comparison group, it can be argued that the results were merely due to chance, spontaneous recovery, or were a result of time. This suggests that more research examining factors related to multiple substance use with more rigorous evaluation designs is needed. Additionally, examining this intervention through a developmental psychopathology lens raises further concerns that call into question its status as an evidence-based practice. For example, researchers claim longitudinal findings when evaluating MI; however, follow-up has not occurred past 15 months. Though documented cases present with harm reduction, there is no support to suggest long term change. Additionally, though MI seeks to use an authoritative relationship to facilitate change in the individual, it fails to directly address underlying developmental mechanisms that may perpetuate substance use behaviors (e.g., history of disrupted attachment and the use of substances as means to regulate emotions).

In contrast, interventions targeting the individual's life experiences may result in more long-term outcomes. Currently, treatment models such as the Community Reinforcement Approach (CRA) operate under the philosophy that each individual is different and dictates that programs should be tailored on a case-by-case basis. CRA recognizes that substance use does not occur in a vacuum; social environments play a large role in an individual's use. CRA incorporates the community (e.g., family, friends, work, extra-curricular activities, other organizations, and spiritual affiliations) to promote and support sobriety and non-using behaviors (Clinkinbeard, 2009; Godley et al., 2011;

Godley et al., 2017; Miller, Meyers, & Hiller-Sturmhofel, 1999).

Randomized controlled trials of CRA found that treatment decreased substance use and illegal activity with adult and young adult substance users (Miller et al., 1999; Roozen et al., 2004). However, the treatment developers also performed the treatments and evaluations. Despite this potential flaw, CRA includes an individualized model that incorporates the environment and life experiences into the treatment. A developmental focus similar to this may assist MI in facilitating long-term change.

In recent years, researchers have incorporated trauma research into various treatment designs. For example, Attachment, Self-Regulation, and Competency (ARC) is a comprehensive intervention framework that was designed to work with children who have experienced complex trauma. Complex trauma has been linked to an array of vulnerabilities such as behavioral, cognitive, and affective difficulties (Cook et al., 2000; Hodgdon et al., 2013). The main goal of ARC is to address developmental and social vulnerabilities that may exist due to early life experiences that may have interfered with healthy development. This framework acknowledges that trauma can impact typical development of stage-salient tasks such as attachment security and emotion regulation. This model hopes to facilitate resilience in children who have experienced complex trauma by providing tools to cope with life stressors. ARC highlights early developmental stage-salient tasks as a source of preventative intervention. Though this approach has not been well established with substance users, a pilot study found ARC reduced various psychological outcomes (e.g., PTSD symptoms, and internalizing and externalizing behaviors; Kinniburgh et al., 2005). This model highlights the importance

of stage-salient task disruptions as foci for potential interventions and may suggest new avenues for work in the substance abuse field if it is discovered that such tasks mediate substance use behaviors.

The Current Study

The current study sought to investigate factors related to emerging adult substance use. Substance use was examined based on severity (frequency of use) and the number of different types of substances used. As previous research suggests, increased ACEs may affect negative adult outcomes. For this reason, the current study builds on the previous body of research by examining attachment quality (anxiety and avoidance) and emotion regulation (cognitive reappraisal and expressive suppression) as possible mediating factors in the relationship between ACEs and substance use behavior in emerging adults. Findings from this study may provide potential information for identifying possible mechanisms that distinguish substance-using emerging adults from those who do not use. Information gathered from this study may highlight the importance of targeting developmental stage-salient tasks in intervention and prevention efforts for substance use, thereby suggesting further refinement of treatment models such as MI and CRA. By adding supports for building corrective attachments and providing skills to promote successful emotion regulation, current treatments (such as MI) may be adjusted to foster long term changes in substance use.

Based on the above review of the literature, the following hypotheses and research questions were developed:

Hypothesis 1. Higher cumulative ACE scores were expected to be positively associated with higher substance use frequency and number of substances used.

Hypothesis 2. Attachment quality was expected to mediate the relationship between number of ACEs and substance use variables (frequency and number of substances used).

Hypothesis 3. Emotion regulation strategies were expected to be differentially associated with substance use frequency. Specifically, suppression was predicted to be positively related to higher substance use frequency, and reappraisal negatively related.

Research Question 1. The current study examined the possible association between higher cumulative ACE scores the specific emotion regulation strategies of suppression and reappraisal.

Research Question 2. The current study examined emotion regulation as a possible mediator between higher cumulative ACE scores and substance use variables (frequency and number of substances used).

Method

Participants

A sample of 182 emerging adults between 18 and 26 years of age ($M = 20.29$; $SD = 2.40$) were recruited from the Psychology Department participant pool ($n = 150$) and through online snowball sampling using social media ($n = 32$), such as Facebook. Participants were entered into a raffle to win one of five Amazon gift cards. University students were given the opportunity to receive extra credit/course credit for classes where applicable. Participants primarily identified as female (72%), predominantly heterosexual (79.6%), people of color (55.5%), and had completed some college (72%). See Table 1 for additional participant characteristics.

Power analysis. Two separate a priori power analyses were conducted with each predictor and outcome variables (number of substances used and substance use frequency). Correlational estimates were taken from studies outlined in the literature review for relationships between substance use variables and ACEs (Brown & Shillington, 2017), attachment dimensions (McDermott et al., 2015), and emotion regulation dimensions (Boden, Gross, Babson, & Bonn-Miller, 2013). Further correlational results were utilized to address the relationships between attachment and emotion regulation dimensions (Dash & Verma, 2017; Stover, Easton, & McMahon, 2013), as well as their relationship to ACEs (Barnett, 2017; Shapero, Abramson, & Alloy, 2016), parenting and intimate partner violence (IPV; Stover, Easton, & McMahon, 2013). A power analysis was conducted following

Table 1
Participant Characteristics

Demographic Variables	(N = 182)	
	<i>n</i>	%
Gender Identity		
Male	47	25.8%
Female	131	72.0%
Other	4	2.2%
Predominant Sexual Orientation		
Predominately Heterosexual	140	76.9%
Predominately Homosexual	11	6.0%
Bisexual	24	13.2%
Other	7	3.8%
Ethnicity		
White/European-American	72	39.6%
Black/African-American	5	2.7%
Asian-American	8	4.4%
Hispanic/Latino/a	57	31.3%
Native American	0	0.0%
Mixed Ethnicity	31	17.0%
Other	9	4.9%
Highest Level of Education Completed		
Completed Middle School/ Jr. High School	1	0.5%
High School Diploma/GED	25	13.7%
Completed Some College	131	72.0%
Bachelor's Degree	20	11.0%
Master's or Doctoral Degree	5	2.7%
Relationship Status		
Married	22	12.1%
Single	124	68.1%
Cohabitation with Partner	35	19.2%
Other	1	0.5%
Employment Status		
Not Employed Outside the Home	89	48.9%
Part-time (1-34 hours)	71	39.0%
Full-time (35 hours or more)	21	11.5%
Other	1	0.5%

methodology outlined by Aberson (2010). Results suggested a sample size between 295 and 343 would produce power of at least .80 to detect significance at $\alpha = .05$.

Procedure

The Institutional Review Board for the Protection of Human Subjects approved the present study (IRB #17-211). Informed consent and participant responses were anonymously collected via Survey Monkey. Participants were provided an informed consent page and clicked yes or no to indicate whether or not they wished to participate in the study. Participants were able to withdraw from the study at any time.

A demographic questionnaire recorded data for age, gender identity, relationship status, predominant sexual orientation, ethnicity, yearly household income, employment status, and education level. See Appendix A for this measure. Following consent and demographic information, participants were automatically guided through four self-report measures examining ACEs, attachment quality, emotion regulation strategies, and substance use that were completed in approximately 30 minutes. Measures were counterbalanced for each participant to address possible test fatigue and ordering effects.

Measures

Adverse Childhood Experiences (ACEs). A modified version of the original adverse childhood experience intake form from Kaiser Permanente was used to measure ACEs (Felitti et al., 1998). This modified version is a 14-item retrospective self-report measure consisting of dichotomous (yes or no) questions, each addressing separate ACEs

(e.g., abuse and household dysfunction). Questions include “During the first 18 years of life, did you live with anyone who had a problem with their use of alcohol or was an alcoholic,” “In the first 18 years of life, did your father, stepfather, or mother's boyfriend/girlfriend ever hit, slap, push, or kick your mother,” and “Did either parent die before you were age 17?”

This version includes additional items addressing death of a parent, prolonged separation from parent, foster home placement, and female-on-male intimate partner violence that was not noted in the original ACE Questionnaire. Moreover, items were updated to expand caregiver types (e.g., “Was your mother/stepmother/foster-mother or father’s girlfriend/boyfriend often pushed, grabbed, slapped, or had something thrown at her?”), include parental criminal justice involvement (e.g., Did a household member commit a serious crime or go to prison?”), and address the growing substance use trend (“Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs or who had a problem with prescription drugs?”). Responses were summed to form a cumulative ACE score. See Appendix B for this measure.

The ACE measure is dependent on retrospective reports of an individual's childhood adversities. Research suggests that the retrospective reports of the unmodified (10-item) version of the ACEs measure has good to excellent test-retest reliability (Cohen’s kappa: 0.46–0.86; Dube, Williamson, Thompson, Felitti, & Anda, 2004). The ACEs measure has shown alpha levels between .75 - .88, suggesting high internal consistency with adult samples (Howe et al., 2015; Murphy et al., 2014). Howe and colleagues (2015) used the current modified version of the ACEs measure and reported a

Cronbach's alpha of .76 when examining a community and a college sample. The current study had a similar Cronbach's alpha of .77.

Experiences in Close Relationships Scale-Revised (ECR-R). The ECR-R is a 36-item self-report measure of adult attachment quality. The measure is comprised of two subscales assessing romantic relationship IWMs of attachment anxiety and avoidance (Sibley, Fischer, & Liu, 2005). Participants rate items on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Attachment anxiety is related to preoccupation and rejection sensitivity toward romantic adult attachments. Attachment avoidance represents a likelihood to detach from adult attachments during times of stress (Brennan, Clark, & Shaver, 1998; Fraley, Waller, & Brennan, 2000). The measure includes items such as, "When my partner is out of sight, I worry that he or she might become interested in someone else," "I find it relatively easy to get close to my partner," and "I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am." See Appendix C for this measure.

The ECR-R has excellent reliability and validity (Fraley et al., 2000; Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010; Sibley et al., 2005). In a university sample ($N = 172$), Sibley, et al. (2005) reported Cronbach's alphas of .93 and .94 for attachment anxiety and attachment avoidance, respectively. Researchers further reported good convergent and discriminant validity in the university sample. Results suggested a good test-retest reliability, $r = .90, p < .05$ and $r = .92, p < .05$, for anxious and avoidant attachment in a college student sample over a three-week period.

When examining emerging adults, the ECR-R has demonstrated acceptable test-retest reliability. Laurent and Powers (2007) conducted a longitudinal study testing a large sample of emerging adults ($N = 398$) over three occasions with a Cronbach's alpha of .91 for attachment anxiety and .86 for attachment avoidance. The current study had Cronbach's alphas of .92 and .94 for attachment anxiety and attachment avoidance, respectively.

Emotion Regulation Questionnaire (ERQ). The ERQ is a 10-item self-report measure. The measure is designed to assess participant use of regulation strategies. Participants rate items on a seven-point Likert scale, with 1 being strongly disagree and 7 being strongly agree. Items include "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm," "I control my emotions by changing the way I think about the situation I'm in," and "When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about." Responses fall into two emotion regulation scales: (1) Cognitive Reappraisal and (2) Expressive Suppression (Gross & John, 2003). See Appendix D for this measure.

The ERQ has demonstrated acceptable convergent and discriminant validity (Gross & John, 2003) as well as adequate internal consistency in different samples (e.g., adolescents, adults, and elderly; Osborne, Willroth, Devylder, Mittal & Hilimire, 2017; Subic-Wrana et al., 2014). One study examining emotion regulation and substance use in a young adult sample ($N = 560$) produced a Cronbach's alpha of .96 for the overall ERQ scale (Wong et al., 2013). Brewer and colleagues (2016) conducted a longitudinal study

examining emotion regulation in emerging adults ($N= 1,568$) with internal consistency ranging from $\alpha = .84-.87$ for reappraisal and $\alpha = .77-.80$ for suppression. The present study had Cronbach's alphas of $.79$ and $.72$ for reappraisal and suppression, respectively.

Substance Use Inventory. The Substance Use Inventory (Reynolds, 2002) used in the current study is a slightly modified Adolescent Psychopathology Scale (APS; Reynolds, 1998). The Substance Use Inventory is taken from the larger Clinical Disorders domain of the APS, and condensed to assess frequency of substance use over a twelve-month period. Participants rated their frequency of substance use based on a six-point scale, with 0 being "never or almost never" and 5 being "several times a day." Substances assessed include cannabis, tobacco (e.g., cigarettes, e-cigarettes, chew, etc.), alcohol (e.g., beer/wine and hard liquor), sedatives (e.g., sleeping pills, opium, heroin, pain killers, etc.), uppers (e.g., cocaine, methamphetamines, etc.), huffers (e.g., paint, glue, spray cans, etc.), ecstasy, and hallucinogens. See Appendix E for this measure. The substance use scale has shown good test-retest reliability, $r = .85$, over a two week period with an adolescent sample (Reynolds, 1998). Internal consistency for the current study was $\alpha = .67$. Number of substances used were recorded in addition to frequencies. Frequencies were averaged to create a total frequency score for each participant.

Results

Assumptions

ACE scores, substance use frequency, and number of substances used were positively skewed, and attachment avoidance was negatively skewed. A square root transformation was performed on attachment avoidance for analyses. ACE scores, substance use frequency, and number of substances used were not transformed due to the nature of the scales.

Assumptions of regression were analyzed prior to analyses. Examination of residual plots found no problems with normality or linearity. Results from Breusch-Pagan tests for homoscedasticity violation were non-significant, suggesting homoscedastic data. Mahalanobis Distance results found four multivariate outliers in the data. For this reason, analyses were conducted both with and without outliers, and results presented accordingly.

Ethnicity was broken down into two comparison groups based on participant self-identification as a person of color. Specifically, due to low rates in each individual ethnic group, participants who self-identified as Hispanic/Latino/a, Black/African-American, Native-American, Asian-American, or mixed ethnicity were placed in the people of color comparison group. With regard to gender, due to low sample size, participants who self-identified as “other” were excluded from analyses.

Sample Differences

Analyses to examine differences between university and public samples found no differences in gender or ethnicity; however, differences in age ($t[180] = -10.23, p < .001, d = 1.99$), education level ($\chi^2[4] = 68.37, p < .001, \phi = .61$), employment status ($\chi^2[2] = 48.21, p < .001, \phi = .51$), and annual income ($t[140] = -5.28, p < .001, d = 1.10$) were present. Overall, public sample participants were likely to be slightly older, working full-time, have a higher annual income, and were less likely to have completed higher education.

As shown in Table 2, t-test analyses revealed no sample differences with respect to ACEs, attachment avoidance, attachment anxiety, cognitive reappraisal, substance use frequency, or number of substances use. Conversely, results indicated that public and university samples differed with regard to expressive suppression. Specifically, university participants utilized this emotion regulation strategy more than participants from the public sample. To increase generalizability and statistical power, samples were combined to examine hypotheses and research questions.

Descriptive Results

Over 80 percent of participants recalled experiencing at least one ACE. In addition, more than one-third of participants reported four or more ACEs. The most common ACE reported was household mental illness (52%), followed by emotional abuse (42%), and household substance use (38%). The data suggest that ACE scores did

Table 2
Independent Samples t-tests and Effect Sizes for All Variables by Sample

Variable	Public		University		<i>t</i>	<i>df</i>	<i>d</i>
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)			
ACEs	2.86	-2.22	3.47	-2.92	1.05	1, 173	0.22
Attachment Avoidance	2.70	1.03	3.16	1.19	1.85	1, 165	0.40
Attachment Anxiety	3.31	1.23	3.63	1.20	1.29	1, 169	0.27
Cognitive Reappraisal	26.93	6.48	27.74	6.52	0.60	1, 176	0.12
Expressive Suppression	13.70	5.68	16.04	5.01	2.18*	1, 175	0.46
Substance Use Frequency	1.37	0.38	1.37	0.39	-0.02	1, 174	0.01
Number of Substances Used	2.79	2.23	2.43	2.08	-0.85	1, 174	0.17

*Note: *p < .05*

not differ significantly by age, annual household income, or education level; however, significant differences were present for females and people of color, $t(182) = -2.05$, $p = .042$, $d = 0.34$ and $t(182) = 2.76$, $p = .006$, $d = 0.43$ respectively. Overall, females and persons of color reported higher ACEs than their male and European American counterparts. See Table 3 for ACE frequencies by gender and ethnicity.

Additional gender and ethnic differences were found with regard to attachment quality, emotion regulation strategies, and substance use outcomes. Specifically, men reported higher levels of attachment avoidance ($t[182] = 2.18$, $p = .032$, $d = 0.36$), substance use frequency, ($t[182] = 3.308$, $p = .002$, $d = 0.62$), and number of substances used ($t[182] = 2.822$, $p = .006$, $d = 0.55$) when compared to female participants. Also, persons of color were found to utilize expressive suppression more than European Americans, $t(182) = 3.05$, $p = .003$, $d = 0.47$.

Table 3
Chi-Square Analyses Examining Gender and Ethnic Differences in ACE Scores

Type of ACE	Gender				Ethnicity				Total
	Male		χ^2	ϕ	PoC		χ^2	ϕ	Total
	(n = 47)	Female (n = 131)			(n = 105)	White (n = 77)			
	n (%)	n (%)			n (%)	n (%)			
Emotional Abuse	16 (8.8)	55 (30.2)	0.69	0.05	51 (28.0)	22 (12.1)	5.72**	0.13	74 (40.7)
Physical Abuse	17 (9.3)	34 (18.7)	1.30	0.07	37 (20.3)	16 (8.8)	3.46	0.11	53 (29.1)
Sexual Abuse	2 (1.1)	34 (18.7)	8.87**	0.17	25 (13.7)	10 (5.5)	2.44	0.09	36 (19.8)
Emotional Neglect	11 (6.0)	48 (26.4)	2.21	0.09	43 (23.6)	19 (10.4)	4.11*	0.11	62 (34.1)
Physical Neglect	3 (1.6)	18 (9.9)	1.17	0.07	13 (7.1)	10 (5.5)	0.99	0.01	23 (12.6)
Parents Divorced	14 (7.7)	50 (27.5)	0.74	0.05	40 (22.0)	22 (12.1)	1.13	0.06	65 (35.7)
Death of a Parent [†]	1 (0.5)	11 (6.0)	1.29	0.08	6 (3.3)	5 (2.7)	0.99	0.01	12 (6.6)
Witnessing Intimate Partner Violence (Male Perpetrator- Female Victim)	5 (2.7)	18 (9.9)	0.10	0.03	18 (9.9)	5 (2.7)	3.51	0.11	24 (13.2)
Witnessing Intimate Partner Violence (Female Perpetrator- Male Victim) [†]	3 (1.6)	17 (9.3)	0.93	0.06	16 (8.8)	4 (2.2)	3.40	0.11	20 (11.0)
Household Substance Use	13 (7.1)	53 (29.1)	1.96	0.08	42 (23.1)	24 (13.2)	0.89	0.06	68 (37.4)
Household Mental Illness/Suicide	18 (9.9)	71 (39.0)	2.99	0.1	50 (27.5)	40 (22.0)	0.40	0.04	92 (50.5)
Household Criminal Involvement/ Incarceration	8 (4.4)	23 (12.6)	0.99	0.01	22 (12.1)	9 (4.9)	1.87	0.08	32 (17.6)
Foster Child [†]	4 (2.2)	5 (2.7)	0.74	0.07	9 (4.9)	1 (0.5)	3.15	0.11	10 (5.5)
Long-term Separation from Parent [†]	6 (3.3)	21 (11.5)	0.09	0.03	23 (12.6)	5 (2.7)	6.64**	0.15	28 (15.4)

Note: PoC = Persons of Color. [†]Indicates additional question added to original ACE Questionnaire (Felitti et al., 1998). *p < .05, **p < .01, ***p < .001

When examining substance use, 56 percent of participants reported using between one and three substances with 26 percent reported using four or more substances. Number of substances used was consistent across age, ethnicity, education level, annual household income, and employment status. On average, participants used two to three substances with a frequency between “a couple of times a month” to “once a week.” Overall, the most common substance use reported by participants was beer/wine (57%), followed by hard liquor (56%), and cannabis (52%). See Table 4 for participant reports of substance use within the last twelve months.

Table 4
Percentage of Participants Reporting Use of Each Substance within the Last Twelve Months

Substance	<i>(N = 182)</i>	
	<i>n</i>	<i>%</i>
Beer/Wine	103	56.6
Cannabis	93	51.1
Cocaine	4	2.2
Downers, Sleeping Pills, Quaaludes	17	9.3
Ecstasy/Other "Designer Drugs"	5	2.7
Hallucinogens (LSD, Mescaline, etc.)	16	8.8
Hard Liquor (Rum, Vodka, etc.)	101	55.5
Meth/Amphetamines, Adderall, Dexedrin, Ritalin, etc.	12	6.6
Opium, Heroin, or Morphine	3	1.6
Pain Killers (Oxycontin, Percocet, Vicodin, etc.)	15	8.2
Sniff Paint, Glue, White-Out, Spray-Cans	3	1.6
Tobacco (Cigarettes, E-Cigarettes, Hookah, Chew, etc.)	46	25.3
Other Drugs (for Nonmedical Reasons) or Alcohol	31	17.0%

Correlational Analyses

Attachment avoidance and anxiety were differentially related to emotion regulation strategies. Specifically, higher levels of attachment anxiety and avoidance

were related to greater use of expressive suppression and reduced use of cognitive reappraisal. Unexpectedly, both substance use frequency and number of substances used were positively related to higher levels of attachment security. Higher ACE scores were significantly related to higher levels of attachment anxiety, attachment avoidance, and expressive suppression; contrary to previous research, however, there was not a significant correlation between ACE scores and substance use outcomes. Results provide support for the relationship between cumulative ACE scores and the use of expressive suppression over cognitive reappraisal. However, results did not support hypotheses predicting the association between ACE scores and substance use outcomes. See Table 5 for zero-order correlations for all variables.

Relationships Between ACEs, Emotion Regulation, and Substance Use

The current study hypothesized that higher cumulative ACE scores would be positively related to substance use frequency and number of substances used; however, results did not support predictions. Nonetheless, higher cumulative ACE scores were predictive of increased use of specific substances. Participants with higher ACE scores used more painkillers, such as OxyContin, Percocet or Vicodin, ($R^2 = .04$, $F[1,173] = 5.52$, $p = .02$) and sedatives (e.g., Xanax, Valium, or sleeping pills; $R^2 = .03$, $F[1,173] = 7.66$, $p = .01$).

To examine more deeply why cumulative ACE scores were not related to overall substance use, multiple regression analyses examined each ACE with regard to frequency

Table 5
Zero-order Correlations Between ACEs, Attachment, Emotion Regulation, Substance Use Frequency, and Number of Substances Used

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ACE Score	--						
(2) Attachment Anxiety	0.25**	--					
(3) Attachment Avoidance	0.25**	0.54***	--				
(4) Cognitive Reappraisal	-0.02	-0.35***	-0.22**	--			
(5) Expressive Suppression	0.23**	0.29***	0.33***	-0.03	--		
(6) Substance Use Frequency	0.07	0.14	0.24**	-0.07	0.1	--	
(7) Number of Substances Used	0.02	0.11	0.28**	-0.11	0.16	0.88***	--

Note: $n = 120$. * $p < .05$, ** $p < .01$, *** $p < .001$

of specific substances. Results of ACE analyses did not differ when examining data with or without multivariate outliers. Combined, all ACEs significantly predicted higher frequency of downer use, $R^2 = .14$, $F(14,160) = 1.81$, $p = .04$; however, no specific ACE uniquely contributed to this relationship. Additionally, together all ACEs significantly predicted use of painkillers, $R^2 = .22$, $F(14,160) = 3.16$, $p < .001$; still, only three ACEs uniquely contributed to this relationship. Household mental illness/suicide ($b^* = -.16$, $p = .04$) was surprisingly related to lower frequencies of downer use, whereas death of a parent ($b^* = .28$, $p < .001$) and household substance use ($b^* = .20$, $p = .02$) were related to higher frequencies of downer use. Additional regression analyses were utilized to examine the first research question.

The first research question sought to investigate the possible association between ACE scores and specific emotion regulation strategies through the use of linear regression analyses. Higher ACE scores were related to expressive suppression ($R^2 = .04$, $F[1,171] = 7.03$, $p = .01$); however, no significant relationship was found between ACE scores and cognitive reappraisal ($R^2 = .02$, $F[1,172] = 0.54$, $p = .46$). Thus, individuals who reported higher cumulative ACE scores utilized expressive suppression more than they used cognitive reappraisal.

To further examine this relationship, a multiple regression analysis was conducted. Together, all ACEs significantly predicted the use of expressive suppression, $R^2 = .14$, $F(14,160) = 1.81$, $p = .04$; but only sexual abuse ($b^* = .23$, $p = .006$) was uniquely related to the use of suppression over and above contributions of all other ACEs.

Relationships Between Emotion Regulation Strategies and Substance Use

Emotion regulation strategies were predicted to be differentially related to substance use frequency. It was hypothesized that expressive suppression would be positively associated with higher substance use frequency, and cognitive reappraisal would be negatively associated. Partial support for this hypothesis was found when analyzing the total sample with multivariate outliers omitted. Specifically, expressive suppression ($R^2 = .03$, $F[1,167] = 6.36$, $p = .01$) was related to higher frequency of substance use; however, there was no relationship between cognitive reappraisal ($R^2 = .01$, $F[1,168] = 0.09$, $p = .77$) and substance use frequency. Different findings resulted from analyzing the total sample with multivariate outliers included. Regression analyses examining the total sample with outliers found no significant relationship between cognitive reappraisal ($R^2 = .01$, $F[1,172] = 0.12$, $p = .73$), expressive suppression ($R^2 = .01$, $F[1,171] = 3.32$, $p = .07$) and frequency of substance use. This suggests partial support for the hypothesis such that individuals who utilized expressive suppression used substances more frequently. Multivariate outliers are extreme scores that influence the distribution of the data, which may impact the outcome of the analyses. These extreme scores may account for why results were no longer significant when included in analyses.

Mediation Analyses

Initial regression analyses found that ACE scores were not significantly related to substance use frequency ($F[1,169] = 0.41$, $p = .53$) or number of substances used

($F[1,169] = 0.08$, $p = .77$). Therefore, the proposed multiple mediation analysis to examine hypotheses and the second research question could not be performed.

Discussion

The present study sought to expand the literature examining emerging adult substance use with the aim of providing potential targets for intervention and prevention focusing on significant developmental milestones. The current study investigated factors related to substance use in emerging adults, including associations between adverse childhood experiences, attachment quality, emotion regulation strategies, and substance use. Adding to previous research, the current study examined the use of multiple substances in relation to developmental stage-salient tasks. Moreover, this was one of the first studies to examine the relationship between cumulative ACE scores and specific emotion regulation strategies. There was only partial support for hypotheses; however, findings extend the literature on ACEs prevalence and links to emotion regulation strategies.

Gender and Ethnicity Differences

There were gender differences in ACE scores, attachment quality, and substance use outcomes. Overall, male participants reported higher levels of both frequency of substance use and number of substances used. Specifically, the current study found that 62 percent of the variability in substance use frequency and 55 percent of the variability in number of substances used was attributed to gender. Past research has found inconsistencies regarding gender differences in substances used (Chassin, Pitts, & Prost, 2002; Nolen-Hoeksema, 2004; Zimmermann, Hundt, Spring, Grabner, & Holsboer,

2003); however, extant research examining young and emerging adults suggest that males typically consume more substances than their female counterparts (Chassin, Pitts, & Prost, 2002; Hussong & Chassin, 2004).

Additionally, female participants in the current study reported higher cumulative ACE scores, with gender accounting for 34 percent of the variance. Though previous research suggests that ACEs are consistent across gender (Brown, Perera, Masho, Mezuk, & Cohen, 2015; Cavanaugh, Petran, & Martins, 2015), the current study was over 70 percent female. This over-representation of female participants may have contributed to higher endorsement in the sexual abuse category, which may account for the higher cumulative ACE scores. This is supported in the literature with females reporting sexual abuse more often than their male counterparts (O'Leary & Barber, 2008; Paine, 2000).

We found that male participants reported higher levels of attachment avoidance. Limited research has examined gender differences in attachment; however, the current study presents with a larger effect size when compared to current literature (Menon, Moyes, & Bradley, 2018; Moreira & Canavarro, 2015). The current gender differences may be influenced by how each gender is socialized to express attachment behaviors within a given culture (Li & Fung, 2014). In other words, if a culture places less emphasis on emotional connectivity for males, they may have a greater tendency for attachment avoidance, as well as for using emotional suppression as a regulation strategy.

Attachment quality did not differ by ethnicity; however, ethnic differences were found with regard to both cumulative ACE scores and emotion regulation strategies.

Persons of color reported higher cumulative ACE scores and utilized suppression to regulate more than their White/European-American counterparts did. These results are consistent with previous research that found ethnic differences in exposure to ACEs. Specifically, Cronholm et al. (2015) found that the prevalence of ACEs was higher when examining an ethnically diverse sample, with over 70 percent of participants reporting at least one ACE. Additionally, research has highlighted the relationships between emotional style and culture (Kitayama & Markus, 1994; Mesquita & Frijda, 1992), which may account for the current results. Kitayama and Park (2010) posit that emotional expression is influenced by cultural upbringing. Thus, cultures that value control of emotional expression may have a higher probability of using suppression to regulate (Matsumoto, Yoo, & Nakagawa, 2008). The current study highlights the relationship between ethnic background and strategies to regulate emotions. Future research should examine this relationship more closely, focusing on cultural socialization practices and the development of specific regulation strategies. Findings from future research can inform current interventions to aid in strengthening skills for emotion regulation and provide supports for underrepresented populations.

While the use of expressive suppression may be culturally normative, its use may be a risk factor for poor health outcomes such as cardiovascular disease (Burns, Quartana, & Bruehl, 2007), thus putting people of color at even higher risk due to increased ACEs and emotional suppression. Studies link substance use with suppression and find higher rates of alcohol and substance dependency in individuals who utilize suppression to regulate their emotions (Wong et al., 2013). This highlights the

importance of creating a treatment model that helps teens and young adults develop healthy emotion regulation strategies. Additionally, providing culturally relevant treatment models may be beneficial in decreasing attrition and relapse rates in substance using individuals of color.

ACEs and Substance Use

Previous research supports the relationship between higher cumulative ACE scores and increased substance use in adulthood (Anda et al., 2002; Dube et al., 2003). Thus, it was predicted that higher cumulative ACE scores would be positively related to substance use frequency and number of substances used; however, this relationship was not found in the current study. Power analyses concluded that a sample between 295 and 343 was needed to produce power of at least .80 to detect significance at $\alpha = .05$. The small sample size in the current study may have not provided enough power to detect the links found in previous studies. Additionally, the current study was primarily female, and previous research suggests that males tend to report higher levels of substance use (Chassin, Pitts, & Prost, 2002; Hussong & Chassin, 2004). Furthermore, the current sample was comprised of primarily university students who may have been hesitant to report their substance use history. Though the predictions regarding ACE scores and substance use were not supported, higher cumulative ACE scores were predictive of increased painkiller and downer use. This supports previous findings linking higher ACE scores to hard drug use in an emerging adult sample (Allem et al., 2015).

Further exploration of this relationship revealed that household mental illness/suicide, death of a parent, and household substance use uniquely contributed to this relationship but in opposite directions. These findings are differentially supported by previous research. Studies show that individuals who experienced household mental illness/suicide in childhood were at a higher risk of developing substance use in later adulthood (Alati, Van Dooren, Najman, Williams, & Clavarino, 2009; Buu et al., 2009; Chassin, Pitts, & Prost, 2002). Present findings seem to contradict these studies, with household mental illness/suicide relating to decreased painkiller use in the current sample; however, previous literature focuses primarily on cannabis, alcohol, and tobacco use/dependence, leaving gaps in understanding specific substance use in relation to ACEs. Thus, the current results highlight the need to further examine this paradox by exploring these life experiences in relation to multiple types of substances. Although results for mental illness/suicide are not in line with past findings, results related to death of a parent and household substance use do support previous conclusions that these early life experiences act as risk factors for substance use and other mental health problems in later adulthood (Buu et al., 2009; Chassin et al., 2004; Høeg et al., 2017).

For example, Høeg and colleagues (2017) examined the effect of early caregiver death on later adult outcomes and discovered that early parental loss had a negative impact on participant adult coping skills. Specifically, research suggests that parental loss in childhood can increase an individual's likelihood of developing symptoms of anxiety, depression, and substance use (Hamdan et al. 2013; Otowa, York, Gardner, Kendler, & Hettema, 2014). Together, findings lend partial support to previous research linking

ACEs to later adult substance use (Anda et al., 2002; Dube et al., 2003; Lui et al., 2016). However, further examination of underlying mechanisms within this relationship is needed to strengthen current treatment approaches. Current findings support the need for additional research examining multiple forms of substance use within emerging adult samples.

Emotion Regulation, ACEs, and Substance Use

The present study was one of the first to examine possible associations between ACEs and specific emotion regulation strategies. Research posits that ACEs can begin a cascade of adaptational failure, which may disrupt one's ability to regulate emotions (Masten & Cicchetti, 2010; Sroufe & Rutter, 1984). Specifically, individuals with more ACEs are more likely to use suppression to regulate their emotions. Past research suggests that high levels of maltreatment in childhood may result in sensitivity to life stressors in adulthood (Hager & Runtz, 2012), which may result in avoidance of strong emotions. This work suggests a linear relationship between suppressive regulation and increased substance use in later adulthood (Wong et al., 2013). In line with these results, it was predicted that regulation strategies in the current sample would be differentially associated with substance use outcomes. Results from this study partially supported this hypothesis with expressive suppression being related to increased frequency of substance use; however, cognitive reappraisal was not related to substance use frequency. Combined, results herein suggest that individuals who have been exposed to a high

number of ACEs in early development, and use suppression to regulate their emotions, may be at heightened risk for non-normative substance use in adulthood.

This highlights the importance of incorporating emotion regulation skills into early developmental training for parents in addition to incorporating this stage-salient developmental marker in treatment programs for those who experience high frequency substance use. Recent studies have examined interventions that incorporate emotion regulation, self-awareness, and social skills building treatments for those who experienced trauma in childhood (Cameron, Carroll, & Hamilton, 2018). Pre-post test results showed significant improvements in emotion regulation and outcomes (e.g., mental well-being, psychological resilience, etc). Research is needed to continue examining this form of intervention with substance-using samples through randomized controlled trials and longitudinal studies.

Limitations and Future Directions

The current study builds on previous research by including multiple substances and examining associations between ACEs, attachment, and strategies of emotion regulation. However, the present study had limitations. The current sample was comprised of primarily female college students. Future studies should assess a more representative sample to increase generalizability. Additionally, the assessment of emotion regulation may be enhanced through the examination of somatic responses instead of solely self-reported strategies. Future research may benefit from including assessments of executive function, temperament, or impulsivity, as each construct has

been associated with substance use in previous literature. Incorporating these constructs may provide a precise understanding of substance use in relation to ACEs. Lastly, this study relied mainly on self-report measures regarding the last year. Hesitation to report substance use may have been present for participants. Social desirability may have influenced participant reports resulting in underestimations of substance use in the current sample. Moreover, reporting concurrent use or use over short periods of time may increase accuracy of substance use assessments.

Conclusion

The primary focus of the current study was to explore possible underlying mechanisms in the relationship between adverse childhood experiences and substance use in emerging adults with the hope of identifying possible targets for future intervention and prevention. In all, results from this study underscore the importance of childhood experiences for emerging adult substance use and may inform current treatment models by suggesting a trauma and culturally-informed approach, as well as incorporating skills to increase healthy emotion regulation. Further research is needed to examine mitigating factors in the relationship between ACEs and substance use to establish additional evidence based-treatment approaches to aid in combating the current substance use epidemic in the United States.

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Appendix A

Demographic Questionnaire

Please answer to the best of your ability. If you do not know the answer, provide your best guess. Give a **single answer** (not a range) for each question.

1. **Age:** _____

2. **Gender Identity:**

____ Male

____ Female

____ Other

3. **Predominant Sexual Orientation:**

____ 1. Predominantly heterosexual

____ 2. Predominantly homosexual

____ 3. Bisexual

____ 4. Other (*please specify*): _____

4. **Ethnicity:**

____ 1. European-American

____ 2. African-American

____ 3. Asian-American

____ 4. Latino(a)-American/Hispanic

____ 5. Native-American

____ 6. Mixed Ethnicity

____ 7. Other (*please specify*): _____

5. **Education Level:**

____ 1. No Formal Education

____ 2. Finished Grade School

____ 3. Finished Middle School or Junior High

- ___ 4. Finished High School
- ___ 5. Some College
- ___ 6. Finished College
- ___ 7. Finished Grad School
- ___ 8. Other (*please specify*): _____

6. Relationship Status:

- ___ 1. Married
- ___ 2. Single
- ___ 3. Cohabitation with Partner
- ___ 4. Separated
- ___ 5. Divorced
- ___ 6. Widowed
- ___ 7. Re-Married
- ___ 8. Other (*please specify*): _____

7. Employment Status:

- ___ 1. Not employed outside the home _____
- ___ 2. Part-time (1-34 hours) _____
- ___ 3. Full-time (35 hours or more) _____
- ___ 4. Other (*please specify*): _____

8. When you were growing up as a child, what was your family's financial situation?

(Choose the answer that most accurately describes the majority of your childhood).

- ___ 1. My family often lacked adequate employment and funds for food, shelter and/or utilities.
- ___ 2. My family's basic needs were met most of the time, but there were times where we were without funds for food, shelter and/or utilities.
- ___ 3. My family mostly had funds for basic needs, but we rarely had money for extras or emergencies.

____4. My family had all major needs met and occasionally some money for extras and emergencies.

____5. My family always had all major needs met and we often had plenty of money for extras and emergencies.

9. What is your personal annual income, in thousands (not counting the income of others in your household)? _____

Appendix B

Adverse Childhood Experiences

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household **often** ...
Swear at you, insult you, put you down, or humiliate you?

or

Act in a way that made you afraid that you might be physically hurt?

_____ Yes
_____ No
2. Did a parent or other adult in the household **often** ...
Push, grab, slap, or throw something at you?

or

Ever hit you so hard that you had marks or were injured?

_____ Yes
_____ No
3. Did an adult or person at least 5 years older than you **ever**...
Touch or fondle you or have you touch their body in a sexual way?

or

Try to or actually have oral, anal, or vaginal sex with you?

_____ Yes
_____ No
4. Did you **often** feel that ...
No one in your family loved you or thought you were important or special?

or

Your family didn't look out for each other, feel close to each other, or support each other?

_____ Yes

_____ No

5. Did you **often** feel that ...

You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?

or

Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

_____ Yes

_____ No

6. Did you grow up with two parents in the home?

_____ Yes

_____ No

7. Did either of your parents die before you were age 17?

_____ Yes

_____ No

8. Was your mother/stepmother/foster-mother or father's girlfriend/boyfriend:

Often pushed, grabbed, slapped, or had something thrown at her?

or

Sometimes or often kicked, bitten, hit with a fist, or hit with something hard?

or

Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

_____ Yes

_____ No

9. Was your father/stepfather/foster-father or mother's boyfriend/:

Often pushed, grabbed, slapped, or had something thrown at him?

or

Sometimes or often kicked, bitten, hit with a fist, or hit with something hard?

or

Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

_____ Yes

_____ No

10. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs or who had a problem with prescription drugs?

_____ Yes

_____ No

11. Was a household member depressed or mentally ill or did a household member attempt suicide?

_____ Yes

_____ No

12. Did a household member commit a serious crime or go to prison?

_____ Yes

_____ No

13. Were you ever a foster child?

_____ Yes

_____ No

14. Were you separated from your parents for one year or more before the age of 17?

_____ Yes

_____ No

Appendix C

Experiences in Close Relationships Scale (ERQ-R)

The statements below concern how you feel in emotionally intimate relationships. We are interested in how you *generally* experience relationships, not just in what is happening in a current relationship. Respond to each statement by circling a number to indicate how much you agree or disagree with the statement.

	Strongly Disagree	Mostly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Mostly Agree	Strongly Agree
1. I'm afraid that I will lose my partner's love.	1	2	3	4	5	6	7
2. I often worry that my partner will not want to stay with me.	1	2	3	4	5	6	7
3. I often worry that my partner doesn't really love me.	1	2	3	4	5	6	7
4. I worry that romantic partners won't care about me as much as I care about them.	1	2	3	4	5	6	7
5. I often wish that my partner's feelings for me were as strong as my feelings for him or her.	1	2	3	4	5	6	7
6. I worry a lot about my relationships.	1	2	3	4	5	6	7
7. When my partner is out of sight, I worry that he or she might become interested in someone else.	1	2	3	4	5	6	7
8. When I show my feelings for romantic partners, I'm afraid they will not feel the same about me.	1	2	3	4	5	6	7
9. I rarely worry about my partner leaving me.	1	2	3	4	5	6	7

	Strongly Disagree	Mostly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Mostly Agree	Strongly Agree
10. My romantic partner makes me doubt myself.	1	2	3	4	5	6	7
11. I do not often worry about being abandoned.	1	2	3	4	5	6	7
12. I find that my partner(s) don't want to get as close as I would like.	1	2	3	4	5	6	7
13. Sometimes romantic partners change their feelings about me for no apparent reason.	1	2	3	4	5	6	7
14. My desire to be very close sometimes scares people away.	1	2	3	4	5	6	7
15. I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am.	1	2	3	4	5	6	7
16. It makes me mad that I don't get the affection and support I need from my partner.	1	2	3	4	5	6	7
17. I worry that I won't measure up to other people.	1	2	3	4	5	6	7
18. My partner only seems to notice me when I'm angry.	1	2	3	4	5	6	7
19. I prefer not to show a partner how I feel deep down.	1	2	3	4	5	6	7
20. I feel comfortable sharing my private thoughts and feelings with my partner.	1	2	3	4	5	6	7

	Strongly Disagree	Mostly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Mostly Agree	Strongly Agree
21. I find it difficult to allow myself to depend on romantic partners.	1	2	3	4	5	6	7
22. I am very comfortable being close to romantic partners.	1	2	3	4	5	6	7
23. I don't feel comfortable opening up to romantic partners.	1	2	3	4	5	6	7
24. I prefer not to be too close to romantic partners.	1	2	3	4	5	6	7
25. I get uncomfortable when a romantic partner wants to be very close.	1	2	3	4	5	6	7
26. I find it relatively easy to get close to my partner.	1	2	3	4	5	6	7
27. It's not difficult for me to get close to my partner.	1	2	3	4	5	6	7
28. I usually discuss my problems and concerns with my partner.	1	2	3	4	5	6	7
29. It helps to turn to my romantic partner in times of need.	1	2	3	4	5	6	7
30. I tell my partner just about everything.	1	2	3	4	5	6	7
31. I talk things over with my partner.	1	2	3	4	5	6	7
32. I am nervous when partners get too close to me.	1	2	3	4	5	6	7
33. I feel comfortable	1	2	3	4	5	6	7

	Strongly Disagree	Mostly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Mostly Agree	Strongly Agree
depending on romantic partners.							
34. I find it easy to depend on romantic partners.	1	2	3	4	5	6	7
35. It's easy for me to be affectionate with my partner.	1	2	3	4	5	6	7
36. My partner really understands me and my needs.	1	2	3	4	5	6	7

Appendix D

Emotion Regulation Questionnaire (ERQ)

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree

1. ____ When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about*.
2. ____ I keep my emotions to myself.
3. ____ When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about*.
4. ____ When I am feeling *positive* emotions, I am careful not to express them.
5. ____ When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.
6. ____ I control my emotions by *not expressing them*.
7. ____ When I want to feel more *positive* emotion, I *change the way I'm thinking about the situation*.
8. ____ I control my emotions by *changing the way I think about the situation I'm in*.
9. ____ When I am feeling *negative* emotions, I make sure not to express them.
10. ____ When I want to feel less *negative* emotion, I *change the way I'm thinking about the situation*

Appendix E

Substance Use Inventory

Please indicate how often you may have used the following substances over the past 12 months.

In the past year I have used:	Never or Almost Never₀	Couple of Times a Month₁	Once a Week₂	Couple of Times a Week₃	Nearly Every Day₄	Several Times a Day₅
1. Marijuana	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Beer/Wine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Hard liquor (rum, vodka, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Downers, sleeping pills, Quaaludes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Cocaine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Ecstasy/Other “designer drugs”	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Hallucinogens (LSD, Mescaline, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Meth/amphetamines, Adderall, Dexedrine, Ritalin, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Sniff paint, glue, white-out, spray-cans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Opium, heroin, or morphine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Pain killers (Oxycontin, Percocet, Vicodin, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Other drugs (for nonmedical reasons) or alcohol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>