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Contextual Influences on a Coping Skills Intervention for Adolescents in Substance Use
Recovery

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Contextual Influences on a Coping Skills Intervention for Adolescents in Substance Use Recovery

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Abstract

Co-occurring disorders of substance use and mental health conditions occur in about 75% of adolescents, with depression ranked as the second most common co-occurring disorder, in 20-30% of adolescents (Hersh et al., 2014; Shrier et al., 2003). Contextual factors (i.e. parental substance use and DCF involvement) put adolescents at increased risk of substance use initiation and co-morbid depression (Clark et al., 2005; Walden et al., 2007). Results from the current literature are undetermined on how to best address co-occurring substance use disorders (SUD) and mental health diagnoses in adolescents. Researchers sought to do this in the current study through a mindfulness-based coping skills intervention, with a sample that included 57 participants, 27 in a recovery high school (RHS), and 29 non-treated comparison participants. The RHS participants engaged in a six-week mindfulness-based coping skills intervention aimed at reducing depression symptomology and emotion dysregulation. Assessments were completed at weeks one and six for RHS participants and at a single assessment time for the non-treated comparison participants. Results showed reduced depression symptomology for the sample as a whole for those indicating parental substance use and DCF involvement. RHS participants indicated high levels of depression above the clinical cut off compared to the non-treated comparison group at the initial assessment and following the six-week intervention. However, RHS participants demonstrated significantly reduced depression symptomology following the six-week mindfulness-based intervention. The current study has treatment implications for reducing depression symptomology via mindfulness-based interventions for youth in early SUD recovery who indicate parental substance use and DCF involvement.

Introduction

Adolescent substance use has reached epidemic levels, with teens increasingly engaging in poly-substance use early in their lifetime: The 2016 annual report from the Monitoring the Future study reported that 48.3% of 12th graders have used an illicit drug in their lifetime, with 24.4% of students reporting substance use in the past 30 days (Johnston, Miech, O'Malley, Bachman, & Schulenberg, 2016). Substance use early in life has multiple outcomes, with many adolescents meeting the criteria for a substance use disorder. The trajectory into adult years indicates that many individuals meet the criteria for dependence, or behavioral and physiological symptoms of addiction (Substance Abuse and Dependence, n.d.). The severity of substance use disorders (SUDs) in adolescence varies, with some presentations as self-limited, indicating that the SUD only lasts a short length of time, while others are considered chronic, often leading to lifelong struggles with sobriety (Cohen, Mannarino, Zhitova & Capone, 2003).

Adolescent's initial engagement in substance use and subsequent abuse stems from a variety of risk factors. The culmination of risk factors leads to severe individual consequences and substantial damage to families and their communities (Cohen et al., 2003; Siegel, 2015). The current literature on adolescent substance use has many reported outcomes, however, we don't know how different risk factors, including comorbid disorders, parental history of substance abuse and DCF involvement, factor into an adolescents initial engagement with treatment and subsequent lifelong struggles to remain sober.

Adolescent Substance Use

Initiation of drug use before 18 years old puts adolescents at a significantly increased risk to develop a SUD before the age of 20 years old, with severe implications resulting in lifelong problems with drug abuse and sobriety (NIDA, 2014). According to the National Survey on Drug

Use and Health, in 2015, 1.2 million adolescents aged 12-17 years old met the criteria for a SUD (SAMHSA, 2016). Of this 1.2 million, only about 10% of adolescents demonstrating the criteria for a SUD received treatment (NIDA, 2014). Adolescents' successful engagement in treatment services represents a different, and at times more difficult, pathway than those of adults. Treating adolescents requires programs to take into account the developmental stage, familial dependence, and cognitive abilities of each individual working towards sobriety, all of which vary in significant ways between adults and adolescents (NIDA, 2014). The trajectory for adolescents who are unable to receive effective treatment contributes to prevalence rates through adulthood: the number of individuals meeting the criteria for a SUD increases from 1.2 million for those aged 12-17, to 5.3 million for those aged 18-25 years old (SAMHSA, 2016). Increased prevalence has implications for negative consequences of elongated substance use, including lifelong struggles with sobriety into adulthood.

Co-occurring Disorders

Co-occurring disorders of substance use and mental health conditions occur in about 75% of adolescents, with depression ranked as the second most common co-occurring disorder, and demonstrates poor outcomes for adolescents mental health, specifically emotion regulation and substance use (Hersh, Curry, & Kaminer, 2014; Shrier, Harris, Kurland & Knight, 2003). A longitudinal research study of youth between 9-to-13-years-old found that children who demonstrated early symptoms of internalizing disorders, specifically anxiety and depression, were at increased risk for initiation of and subsequent alcohol abuse (Kaplow, Curran, Angold & Costello, 2001). Depression beginning in adolescence has implications for poor outcomes into adulthood, such as social and educational impairments, increased risk of smoking and substance

misuse, obesity, increased suicidal behavior, and increased risk of anxiety and bipolar disorders (Thapar, Collishaw, Pine, & Thapar, 2012).

Adolescents who present solely with substance abuse face numerous hardships in becoming sober and maintaining sobriety. For those who present with co-morbid disorders, such as depression, the risk factors increase due to implications for poor outcomes, such as increased risk of suicide attempts, increased smoking, increased risk of other mental health, and increased mortality rates (Aharonovich, Liu, Nunes, & Hasin, 2002; Morozova, Rabin, & George, 2015; Thapar et al., 2012). The co-occurring disorders can manifest in numerous ways: adolescents can face a mental health disorder which precedes or helps to moderate substance use, or mental health disorders may develop as a consequence of substance use (Hersh et al., 2014).

According to the 2015 National Survey on Drug Use and Health, 350,000 adolescents have co-occurring substance abuse and mental health diagnoses (SAMSHA, 2016). Over the years, co-morbidity has shown to be the rule, and not the exception when it comes to at-risk adolescents who engage in substance use, demonstrate internalizing behaviors, such as depression, and poor distress tolerance in regards to their ability to effectively manage their emotions (Hersh et al., 2014). These behaviors provide increased risk to initiate substance use as a means to distract from uncomfortable emotional states (Perplechikova, Krystal, & Kaufman, 2008; Hersh et al., 2014).

Depression is the second most common co-occurring disorder with substance use in adolescence, occurring in 20-30% of the population (Hersh et al., 2014). Still lacking is a full understanding of which co-occurring disorder - either substance use or depression - occurs first, and whether, or how, this impacts adolescents' treatment (Hersh et al., 2014). There are implications for co-occurring mental health and SUDs in adolescents on treatment, including

treatment planning and care coordination that focuses on individualized services to meet each youth's specific needs. Evidenced-based integrated interventions have been shown to address the SUD and mental health disorder simultaneously, such as cognitive behavioral therapy and motivational interventions (Hawkins, 2009).

Emotional Distress in Depression. To date, research has demonstrated an understanding that many adolescents find adaptive ways to respond to their depression; however, others engage in risky behaviors to improve their internal experiences of emotion dysregulation, which can lead adolescents to initiate substance use (Auerbach, Claro, Abela, Zhu & Yao, 2009). Many adolescents who report depression symptomology indicate they engaged in these risky behaviors as a means to provide temporary relief from emotional distress, even though they were engaging in maladaptive emotion regulation strategies. The difficulty youth face when engaging in high-risk behaviors is that risky behaviors can be negatively reinforced and become the preferred coping techniques, instead of youth addressing their inability to tolerate subsequent distress in more adaptive ways (Auerbach et al., 2009).

The current literature on the impact of a co-occurring mental health disorder on an adolescent's substance use is inconclusive. Hersh and colleagues (2014) reported that at times depression symptomology impacted substance abuse treatment negatively; while at other times it demonstrated increased positive outcomes for those in substance use treatment. Hersh and Colleagues (2014) looked at eleven research studies on co-morbid depression and SUD, and reported that these two constructs do not have a simple relationship for treatment outcomes. Overall, co-morbid conditions do not necessarily mean that youth will have poorer outcomes for SUD treatment, but sometimes evidence-based interventions targeting depression do not have positive outcomes for SUD treatment directly. Horigian and colleagues (2013) on the other hand,

reported on the positive impact of substance use treatment on the reduction of internalizing symptoms, including depression symptomology. Children and parents reported significant reductions in symptoms of Major Depressive Disorder (MDD) after treatment for SUD, and concluded that future studies need to look into the scope of SUD interventions. Specifically, their results support a broader ability of treatment to target internalizing symptoms beyond those targeting substance use and abuse (Horigian et al., 2013).

Contributing Factors to Adolescent Substance Use

There are connections between contextual and individual risk and protective factors for at-risk youth, including pathways from depression symptomology and emotion dysregulation to stressful life events and self-control (Wills, Simons, Sussman, & Knight, 2015). Family risk factors negatively impact the initiation of substance use for adolescents, including parent history of substance use, family stability, poor emotion regulation and maladaptive coping skills (Auerbach et al., 2009; Gruber & Taylor, 2008).

Contextual Factor: Parental Substance Abuse. Children who grow up with a substance-using parent are more likely to display psychological and behavioral problems (Gruber & Taylor, 2008). Longitudinal research has demonstrated a link between adolescents with parental alcohol abuse and the trajectory of adolescent problem drinking, as well as the escalation of problem drinking into adulthood (Warner, White & Johnson, 2007). Consistent evidence links familial substance use to adolescent engagement with and dependence on substance use (Walden, Iacono, & McGue, 2007).

Clark and colleagues (2005) followed children from ages 11-19, and discovered that childhood risk predictors included having parents with SUD, adolescent early tobacco or alcohol use, and adolescent poor emotion regulation. This study reported that adolescents with two

substance-using parents were at a significantly accelerated risk of substance involvement themselves. Adolescents reported that they often initiated drug use to rebel or ease tension at home; however, those with supportive family relationships report these relationship qualities as a deterrent for drug use (Gruber & Taylor, 2008).

Contextual Factor: Family Stability and DCF involvement. In the state of Connecticut, the Department of Children and Families (DCF) is responsible for the wellbeing and protection of youth from neglect or abuse, and aims to strengthen the advocacy and support for families. The overall goal of DCF is to increase the existing family and community strengths to help children who face emotional and behavioral challenges (Department of Children and Families, 2017). Youth and their families typically enter into DCF services when a case is made that the parents are unable to appropriately and consistently attend to their child's needs. A large number of cases report parental substance use and poor modeling of behavior, as the main reason for DCF involvement within the home. Research has shown that relationship factors play a significant role in the development of adolescent substance use, specifically through parents modeling substance use behaviors (Walden et al., 2007). Reports of these behaviors can initiate a case with DCF, through which the child protective services investigate each report and make a recommendation to the legal system regarding the well-being of the child. The legal system can choose to remove the child from substance-using environments, however; the learned behaviors of substance use interaction continue (Walden et al., 2007). For the purpose of this paper, DCF involvement is indicative of youth being raised in a home with increased risk factors, which may include parental substance use and poor understanding of emotion regulation. These factors may be a proxy for indicators of early adolescent engagement in substance use.

Individual Factor: Emotion Dysregulation in Depression Symptomology. Difficulties with emotion regulation are significant for those with substance abuse, including distress tolerance, or the degree of physiological discomfort they can withstand, and their ability to escape their distress (Kring, 2010; Siegel, 2015). Poor emotion regulation is significantly associated with an adolescent's level of substance use (Wills et al., 2011). Specifically, direct effects were shown between emotion dysregulation and internalizing and externalizing symptomology, such as depression symptomology, with increased initiation of substance use (Wills et al., 2015). The pathways to substance use were affected by patterns of increased difficulties with emotion regulation and subsequent coping patterns. In particular, those who suppress or use other individuals as support to cope demonstrate earlier initiation of substance use (Wong et al., 2013). There is a positive moderating effect of high parental emotion dysregulation on adolescents' display of increased difficulties with emotion regulation and depression symptomology (Gratz & Roemer, 2004; Han & Shaffer, 2013; Wills et al., 2015). At risk adolescents who demonstrate early difficulties with emotion regulation and subsequent substance use are negatively impacted by familial characteristics (i.e. family attachment patterns, conflict, and substance use; Siegel, 2015). Overall, the literature suggests a relationship between adolescents with difficulties regulating their emotions at an early age, and its subsequent impact on familial support, internalizing symptomology, and subsequent early initiation of substance use. This has implications for interventions addressing emotion regulation for youth at risk of substance use initiation.

Treatment Options for Adolescent Substance Use and Depression

At-risk youth in early substance use recovery face numerous difficulties, particularly to remain sober. The ability to remain sober is impacted by an adolescent's accumulation of risk

factors, including depression symptomology and emotion dysregulation as a product of their drug use (Fox, Hong, & Sinha, 2008). Current research on the relationship of depression symptomology and substance abuse in adolescents reveals mixed results. Research is inconclusive on how depression symptomology and substance use treatments are related, however, depression symptomology is reduced in substance use treatment, along with substance use being reduced by improved mood overall (Horigian et al., 2013).

Emotion Regulation and Substance Abuse Treatment. An individual's ability to regulate their emotions is central to mental health, with chronic difficulties regulating emotions linked to pathology. Studies have shown the importance of focusing on the underlying emotional disorders, including depression, in the planning and initiation of early intervention and prevention protocols for substance using youth (Siegel, 2015). Numerous studies revealed the positive impact of improving overall mood for substance using youth. Specifically by addressing and strengthening emotion regulation via mindfulness, with effectiveness demonstrated for cognitive frameworks, such as Cognitive Behavioral Therapy (CBT; Breslin, Zach & McMain, 2002; Burke, 2009; Siegel, 2003; Southam-Gerow & Kendall, 2002; Thompson, Arnkoff & Glass, 2011). Despite the inconclusive state of the current literature on treatment outcomes for comorbid disorders, there is demonstrated improvement in depression symptomology outcomes from Dialectical Behavioral Therapy interventions (DBT; Ritschel, Cheavens & Nelson, 2012).

DBT is used with multi-problem youth and highlights the reciprocal relationship of an individual on the environment, and the environment on the individual (Miller, Glinski, Woodberry, Mitchell, & Indik, 2002). DBT focuses on individuals facing personal and environmental risk factors, including poor emotional and self-regulation skills, and inability to tolerate distress, which block their ability to adaptively use coping skills. Maladaptive coping

skills interfere with self-regulation abilities and lead to negative behavioral patterns (Linehan, 1993; Miller et al., 2002).

DBT is an empirically supported treatment for SUD and comorbid disorders (Linehan, Schmidt, Dimeff, Craft, Kanter, & Comtois, 1999; Linehan, Dimeff, & Reynolds, 2002).

Substance use can be a means to avoid or decrease emotional distress, with the aim of treatment to increase control of actions through improved emotion regulation (Axelrod, Pereplechikova, Holtzman, & Sinha, 2011). It is important to consider how substance use may reinforce the preexisting symptoms of internalizing disorders - specifically depression symptomology and emotion dysregulation - and how this will impact treatment modalities (Cohen et al., 2003).

Adolescents' initial engagement with substance use is often due to their inability to tolerate their current distress, and can reinforce the adolescents use of maladaptive coping skills to tolerate their emotion dysregulation and depression symptomology. Adolescents, who present with SUD, and often co-occurring disorders, find themselves in need of a higher level of care than traditional outpatient therapy to appropriately manage their behavioral and emotional difficulties, and recovery high schools are one means to assist this population.

Recovery High Schools. Recovery high schools were first formed in 1979 in response to the education policy reform that advocated for school-based substance use recovery programs as a treatment option (White & Finch, 2006). To date, approximately 35 recovery high schools (RHS) operate within the United States, with four founding characteristics: 1. The primary purpose of the school is to educate students in early recovery from substance use or co-occurring disorders, 2. It meets state requirements to award students with high school diplomas, 3. It is intended for all students to be in recovery and working a program of recovery, and 4. The RHS consists of a traditional academic curriculum, along with a focus on developing supportive life

skills for youth in early substance use recovery. The overall goal is for students to receive a high school diploma in a setting in which they are provided prosocial support for elongated sobriety. The school must be available to any student in recovery who meets state eligibility requirements of attendance (Association of Recovery Schools, 2013). The small literature available on RHSs indicates that adolescents attending such programs demonstrate similar risk factors, including mental health diagnoses (beyond SUD), such as depression symptomology, poor school performance, and involvement in the juvenile justice system (Calear & Christensen, 2010; Moberg, Finch & Lindsley, 2014). Students enter into RHS from a variety of referral sources, including requirements from parents, social workers, probation officers, or previous school staff (Moberg et al., 2014). RHS are a treatment setting where reducing internalizing and externalizing symptomology for adolescents in substance use recovery is the target, with the hopes of addressing co-morbid problematic symptoms in one treatment system.

Current Study

Based on the literature reviewed above, co-morbid depression and substance use disorders are a growing epidemic, with inconclusive results of how to best address this issue in treatment (Hersh et al., 2014; Johnston et al., 2016). Hersh and colleagues (2014) discussed how co-morbidity is the rule, and not the exception; yet research is undetermined of the pathways to co-morbidity and its subsequent impact on treatment. The literature supports increased risk factors of parental substance use and DCF involvement, and early engagement of substance use for adolescents (Walden et al., 2007; Warner et al., 2007). There is a gap in the literature looking at the contextual factors, including depression symptomology, emotion dysregulation, parental substance use, and DCF involvement, and how this impacts adolescents in early SUD recovery's treatment. Currently, research has shown promising results for mindfulness-based interventions,

such as DBT, in the improvement of mood and reduction of substance use for adolescent populations (Linehan, 1993; Linehan et al., 1999; Linehan et al., 2002; Miller et al., 2002).

Therefore, the current study used a pre/post-test analysis on a six-week mindfulness-based coping skills intervention for adolescents in a RHS. The goal of the current study was to understand how reducing depression symptomology for adolescents in early substance use recovery could be influenced by contextual factors (family substance use and DCF involvement). These factors were additionally assessed in a non-treated comparison group of adolescents, many of whom indicated using substances on a regular basis, but do not present with a diagnosed SUD. The researchers were interested in how these two groups differed at the initial assessment. Additionally, we were interested if following the six-week intervention, RHS participants would demonstrate reduced depression symptomology. The goal of the intervention was that the participants in early recovery would show improvements in their overall mood via reduced clinical depression symptomology and increased emotion regulation.

Along with the goal of providing additional depth to the current adolescent recovery literature, the study was additionally motivated by a set of research questions. The research questions first focus on the initial assessment responses provided by the RHS participants and the non-treated comparison group. Therefore, we explored the overall group of 57 participants. We were interested if family characteristics (e.g. parent substance use and DCF involvement) were significant predictors of participants' depression symptomology. Further, we wondered if DCF involvement would provide additional meaningful differences in depression symptomology at the initial assessment. Finally, we were interested in exploring any differences in depression symptomology for the RHS adolescents at the initial assessment from those in the non-treated comparison group.

Our next set of research questions focused on the RHS participants following the six-week intervention. Therefore, we explored any differences in mean scores for depression symptomology following the six-week intervention. Finally, we explored whether family factors were significant influences in any differences that emerged (whether the presence of adolescent known parental substance abuse affected depression symptomology following the six-week intervention).

Hypothesis. Overall, we hypothesized that the constructs (depression symptomology, parental substance use, and DCF involvement) would be significantly worse for those in the RHS and those in the non-treated comparison group.

H1: For all participants, if DCF involvement and parental substance use are indicated at the initial assessment, then these factors will predict participant depression symptomology.

H2: For all participants, if DCF involvement is indicated at the initial assessment, then increased depression symptomology will be reported.

H3: If patterns of depression symptomology are present in RHS participants, then their symptomology would be significantly worse at the initial assessment compared to the non-treated comparison group.

H4: If RHS sample participated in the six-week intervention, then they would demonstrate significantly reduced depression symptomology compared to their initial assessment.

H5: If adolescents in the RHS sample reported parental substance abuse, then they would report increased depression symptomology following the six-week intervention compared to those who did not report parental substance use.

Methods

This study focused on the experiences of depression symptomology in participating students at an initial assessment and following a six-week mindfulness-based coping skills intervention series informed by DBT. Data collection occurred in 2015 at a RHS in the Northeast United States promoting an abstinence only method of treatment, which required, enrolled students to have a minimum of 30 days of sobriety.

Additionally, data was collected for a size-matched sample of youth without a diagnosed SUD as a non-treated comparison group through convenience sampling. The non-treated comparison group allowed this study to compare age- and gender-matched adolescents who are in early substance use recovery to those who do not have a SUD, however many indicated using substances on a regular basis. The non-treated comparison sample allows for an exploration of depression symptomology for those with and without a SUD diagnosis. Students enrolled in the RHS that could read and speak English were eligible to participate; the current study applied an inclusive approach, using no other inclusion/exclusion criteria.

Participants

Two groups of high school-aged students participated in the current study, the treatment group consisted of RHS students, and the other was a non-treated comparison group recruited through convenience sampling.

RHS Participants. RHS participants (n=27; 66.7% male; average age 17.26 years, *SD* =1.48) volunteered their participation, representing 100% of the students enrolled in the school at the time of the study. Participants engaged in a six-week mindfulness-based coping skills intervention, which focused on mindfulness activities and strategies. The intervention was evaluated by means of a pre and post-test design. The majority of participants were

Caucasian/non-Hispanic (n=17; 63%), 5 (18.5%) identified as Hispanic or Latino, 2 (7.4%) identified as African American, and 1 (3.7%) identified as Asian/Asian American. The majority of participants reported single parent guardianship (n=11; 40.74%), with 8 (29.6%) participants reporting joint parent guardianship, 2 (7.4%) participants reported either foster or grandparent guardianship, and 5 (18.5%) reported no guardianship by dint of being 18 or older. More than half of the participants (n=14, 52%) reported a current case open with the state's child protection services (Department of Children & Families; DCF). Participants reported on their known parental substance use, such that 15 (55.5%) participants reported parental substance use (see *Table 1* for further details on family descriptives). When participants were asked to report on their own substance use, specifically their drug of choice, the most common trends were: 17 (63%) reported alcohol, 20 (74%) reported marijuana and 10 (37%) reported heroin. Participants reported sobriety dates as well, with the average length of sobriety of 6.03 months (SD = 6.03 months) prior to the intervention. See *Table 1* for further information on demographic characteristics.

Non-treated Comparison Participants. Non-treated comparison group participants, those without a diagnosed SUD (n=29; 69% male; average age 17.55 years; $SD=2.03$) were recruited through convenience sampling by finding appropriately aged adolescent volunteers at the local mall, library, and through word of mouth. Participants in the non-treated comparison group received the measures set at one time point in order to understand their initial reporting of depression symptomology, but were not subjected to the six-week intervention. The majority of the comparison group was Caucasian/White (n = 23; 79.3%), 3 (10.3%) were Hispanic, and 3 (10.3%) identified as African American. The majority of participants reported joint parent guardianship (n=22, 75.9%), 6 (20.69%) participants reported single parent guardianship, and

only 1 (3.4%) reported no guardianship by dint of being 18 or older. As compared to the RHS students, only two (6.89%) participants reported having an open case with DCF. Sixty-five percent (n=19) of participants reported parental history of substance use (see *Table 1* for further details on family descriptives). When reporting their own substance use, specifically their drug of choice, the most common trends were: 16 (55.2%) reported alcohol, 7 (24.1%) reported marijuana, and no participants reported heroin. Participants reported sobriety dates as well; only those who had used substances in their lifetime are reported here (n = 23; $\mu = 0.39$ months, $SD = 0.52$ months). See *Table 1* for further information on demographic characteristics.

Summary of Background Characteristics. Participants in the two groups, RHS and non-treated comparison, appear to be roughly comparable on one drug of use, alcohol, as it was the highest in use between the two groups. The two groups differed in their descriptives around the number of participants who had used different drugs, with only RHS participants reporting using prescription pills, hallucinogens, and heroin. Another reported similarly was the most common known parental substance used, in which alcohol was reported for with 40.7% of RHS and 62.7% of non-treated comparison participants. However, only participants in the RHS reported knowledge of their parents using illicit substances, such as heroin or cocaine. Additionally, the two samples appear to be different in regards to their sobriety length, with the majority of RHS participants reporting 6 months of sobriety (likely by dint of enrolling in a program that requires 30 days sobriety), versus non-treated comparison participants, with the majority reporting use as recent as the day prior to participating in the study. Further, six participants in the comparison group reported life-long sobriety. Participants also appear different in regards to their parental custody, with the majority of non-treated comparison participants indicating joint parental custody (75.86%), and the majority of RHS participants

indicating single parent or non-parental custody (59.24%). Participants in the two groups also look different with regard to DCF involvement, with roughly half of the RHS participants indicating DCF involvement, and only two non-treated comparison participants reporting such. Finally, the two groups differ in their levels of clinical depression, as approximately one-third of comparison group participants reported this level of depression, whereas the majority (70.4%) of participants in the RHS reported clinical depression at the initial assessment (note, this rate reduces to 52.2% post-intervention, still considerably higher than the comparison group).

Procedure

The Institutional Review Board at the University of Connecticut approved all methods of the current study. RHS participants were recruited to participate in the current study by the school's principal, who sent participation invitations and a summary of the research study home to the students' families prior to data collection. Each RHS has their own established culture pertaining to how enrolled students participate in research. The current RHS's policy dictated the use of passive consent, by which only signed and returned opt-out paperwork indicated that a student was unable to participate. The non-treated comparison group participants were recruited through convenience sampling by means of local high schools, public libraries, or other comparable community settings, and completed the study by scheduling an individual appointment with a member of the research team. Each group, intervention and non-treated, was provided an overview of the study prior to completing the measures online through an anonymous survey. Participants in the RHS completed the assessment at enrollment and after session six, while the non-treated comparison sample completed the assessment at a single time point for an initial assessment. RHS and non-treated comparison participants completed the measure set

online using Qualtrics, which included a background demographic questionnaire, and the CES-D measure of depression (Radloff, 1977).

RHS participants received a six-week mindfulness-based coping skills intervention, largely derived from the behavioral skills set presented in Linehan's (1993) DBT approach to improving emotion regulation. The focus of intervention was inspired by the evidence-based research supporting DBT's treatment for individuals with comorbid disorders of SUD and and borderline personality disorder (BPD; Linehan et al., 1999; Linehan et al., 2002). Individuals with BPD are often affected by their inability to appropriately regulate their emotions and tolerate distress, similar to those presenting with depression symptomology in early substance use recovery. Therefore, the research team created a six-week program to provide weekly workshops for the students in the RHS to provide psychoeducation and strategies for improved emotion regulation.

The first week focused on wise mind, or an individual's ability to integrate their emotional and reasonable minds, specifically looking at the "what and how" of mindfulness skills. The second week focused on wise mind and interpersonal effectiveness. Situations of interpersonal effectiveness included, attending to relationships, balancing priorities versus demands, balancing the wants-to-should, and building mastery and self-respect. The third week focused on distress tolerance skills and accepting reality, defining distress tolerance as an individual's ability to withstand and accept their current situation in a non-judgmental manner, and mindfulness of accepting reality (for example, through deep breathing and awareness of body position). The fourth week focused on distress tolerance skills for crisis survival, including activities such as distracting with wise mind, and self-soothing with the five senses. The fifth week of the intervention examined emotion regulation, specifically how to identify emotions in

the self and others. The final session of the intervention addressed emotion regulation again, but through the lens of the function of emotions and how to challenge difficult emotions. Time was given to reflect on the past six weeks and how skills taught impacted the adolescents' abilities to label, understand, and intervene in distressed states through mindfulness techniques and emotional awareness.

Measures

As noted above, the demographics and background characteristics survey captured student survey data on key variables, including DCF involvement, adolescents' reported parental substance abuse, adolescents' drug of choice, and participants' sobriety dates. For analytic purposes two variables were dichotomized to yes/no format: parental substance use and clinical cut off of depression symptomology. In addition to the demographic and background characteristics survey, a measure of depression was used as described below.

The Center for Epidemiological Studies-Depression. Symptoms of depression were assessed using the CES-D Scale, a 20-item questionnaire designed to measure current levels of depression symptomology in the general population, with a focus on the affective component of depressed mood (Radloff, 1977). Using a 4-point Likert scale, participants responded to items based on how they had felt during the previous week. Sample items include, *"I felt like I could not shake off the blues even with help from my family"* and *"I felt everything I did was an effort."* The CES-D is designed to discriminate between those with clinical level depression versus those in the general population, with scores interpreted through the level of symptoms presented that accompany depression symptomology. Responses were summed, with a range of 0-60, in which higher scores indicated greater presence of depression symptoms, with a score of 16 or higher indicating clinical depression (Radloff, 1977). Participants' depression

symptomology was dichotomized as either above or below the clinical cutoff in order to distinguish between participants indicating some depression symptomology, and those reporting levels of symptomology warranting a diagnosis and need of treatment. This measure has excellent internal consistency in the current sample, with a Cronbach's alpha of .93. This measure of internal consistency is on par with Radloff (1977) who reported a Chronbach's alpha of .90 for inpatient samples, and .85 for the general population, as well as a recent study reporting a Chronbach's alpha of .89 for Korean American adolescents, and .88 for European American adolescents (Kim, Landis, & Cain, 2013).

Results

Descriptive Statistics

RHS participants average score on the CES-D at the initial assessment was 26.96 ($SD=13.45$), and at post-test reported a statistically significant reduction of 21.52 ($SD=14.07$), while the non-treated comparison sample revealed an average score on the CES-D of 12.69 ($SD=8.31$). The non-treated comparison sample fell on average below that of the clinical cutoff for depression, which is 16 according to the CES-D, while the RHS participants on average fell above the clinical cutoff at both pre-test and post-test. At the initial assessment, 19 (70.4%) of RHS participants were above the clinical cutoff for depression, with this number reducing to 12 (52.2%) of participants following the six-week intervention. Participants in the non-treated comparison group reported 11 (38%) of participants above the clinical cutoff for depression. See *Table 1* for further demographic characteristics.

Hypothesis testing

Hypothesis 1. To test our first hypothesis that increased depression symptomology was predicted by DCF involvement and parental substance abuse for all participants, we ran a linear regression using initial assessment data for the RHS group (*Table 3*). Depression symptomology at the initial assessment was significantly predicted by DCF involvement and reported parental substance use ($\beta = -13.22$, $t_{(2,53)} = -3.68$, $p < .01$). The analyses revealed that the DCF involvement and parental substance use accounted for 20.4% of the variance of depression symptomology ($R^2 = .20$, $F_{(2,53)} = 6.78$, $p < .01$). These results indicate that at the initial assessment, participants' depression symptomology was significantly predicted by their DCF status and the presence of parental substance use *regardless* of which group, intervention or comparison, they belonged to.

Hypothesis 2. To test our second hypothesis, that for all participants, those with DCF involvement would report significantly higher depression symptomology at the initial assessment, an independent samples t-test was run. This mean comparison test showed a significant difference in the CES-D at the initial assessment for participants with DCF Involvement ($t = 3.66_{(2,53)}$, $p < .01$; See *Table 3* for further information). These results suggest that prior to any intervention, those with DCF involvement demonstrate more depression symptomology than those reporting no current DCF involvement.

Hypothesis 3. To test our third hypothesis that the patterns of depression symptomology in RHS adolescents would be significantly worse at the initial assessment from the non-treated comparison group, an independent samples t-test was run, and showed a significant mean score difference between group for the continuous cut-off of the CES-D ($t = 4.82_{(2,53)}$, $p < .01$). These results indicate a significant difference in depression symptomology between adolescents without a SUD and those in early recovery from SUD. See *Table 4* for further information.

Hypothesis 4. To test our fourth hypothesis, that following the six-week intervention, adolescents in the RHS would demonstrate significantly reduced depression symptomology, as indicated by the reported continuous CES-D results, from their initial assessment, a paired samples t-test was run. Results showed a significant difference between the initial assessment and the post-test CES-D following the six-week intervention ($t=2.36_{(2,22)}, p<.05$). These results indicate that following the intervention; participants in the RHS sample demonstrated significantly reduced depression symptomology. While their average score (μ 21.52, $SD=14.07$) was still above the clinical cutoff of the CES-D of 16 or higher, they did show significant reductions of depression symptomology over the course of the six-week intervention. See *Table 5* for further information.

Hypothesis 5. To test our fifth hypothesis, that adolescents in the RHS sample who reported parental substance abuse ($n=15$) would demonstrate increased depression symptomology following the six-week intervention compared to those without reported parental use, an independent samples t-test was run. Results from this comparison revealed a significant difference of post-intervention mean scores on the CES-D based on reported parental substance use ($t=-1.06_{(2,21)}, p< 0.01$). These results indicate those in early substance use recovery with parental substance use saw significantly less impact on their depression symptomology following the six-week intervention. See *Table 6* for further information.

Discussion

Adolescent substance use has reached epidemic prevalence rates (Johnston et al., 2016); recent increases may be explained in part by the presence of co-occurring disorders like Major Depressive Disorder and reported parental substance use and/or DCF involvement. The current study contributes to the literature addressing adolescent high-risk behaviors, including substance

use and depression symptomology, through its examination of a sub-population of adolescents in early substance use recovery attending a RHS. Further, we examined the possible impact that contextual factors of parental substance use and DCF involvement may have on an individual's depression symptomology while in early recovery. Recovery high schools are one treatment context that aims to address the current need of youth to remain sober, obtain a high school diploma, and gain skills to combat negative events testing their abilities to adaptively cope. In an attempt to understand these contextual factors, the current study used a six-week intervention that explored the impacts of mindfulness-based coping skills (e.g., emotion regulation and distress tolerance) for adolescents in a RHS.

Our first hypothesis considered the overall sample, combining the RHS and the non-treated comparison participants, and explored whether depression symptomology was predicted by DCF involvement and reported parental substance use for all participants. Research has indicated family risk factors, including parental substance use, has impacts on adolescent emotion dysregulation and substance use initiation (Auerbach et al., 2009; Gruber & Taylor, 2008). Our analyses revealed similar results, in that parental substance use and DCF involvement partially predicted depression symptomology. The overall regression model was significant, however, when looking at individual beta weights, only DCF involvement was significant. Therefore, the prediction of this model is entirely based on DCF involvement, indicating it is a strong enough contextual factor to overcome the insignificance of parental substance use in this model. Walden and colleagues (2007) reported that parental substance use was a risk factor for adolescent early engagement with substance use, and noted how parents model use behaviors for their children in the home. Furthermore, longitudinal results showed that parental substance use

has significant effects on children's depression symptomology and externalizing symptoms, including substance use in young adulthood (Chassin, Pitts, DeLucia, & Todd, 1999).

The second hypothesis explored the differences in depression symptomology, as a continuous clinical cutoff level, present in those in the RHS sample versus those in the non-treated comparison group. Results indicate that the majority of RHS participants (70%) demonstrated clinical levels of depression, versus those in the non-treated comparison group (38%). These results echo other research focusing on the link between co-morbid depression and substance use in adolescents. Rohde and colleagues (2014) performed a randomized-controlled trial for 170 adolescents in comorbid treatment for SUD and depression, and found that following 24 treatment sessions, and at 6- and 12-month follow-ups, depression was significantly reduced for programs addressing depression symptoms early in treatment, and helped to reduce substance use outcomes. Specifically, adolescents indicate using substances to manage their internalizing behaviors of depression and difficulty managing emotions, along with using substances as a means to distract from internalizing behaviors, like depressed mood (Auerbach et al., 2009). Additionally, studies have shown the positive impact of SUD treatment on reduction of depression symptoms (Hersh et al., 2014; Horigian et al., 2013; Perplechikova et al., 2008).

The study focused on the impact of the mindfulness-based coping skills intervention on depression symptoms for youth in early recovery. As a result, we focused on the difference between the two groups, specifically increased symptomology, more DCF involvement and parental substance use from the RHS sample. We focused on the RHS participants demonstrating decreased depression symptomology following the six-week intervention (52% falling above the clinical cut-off at post-test, versus initial 70%). Compared to the non-treated comparison group at the initial assessment (38% above clinical cut-off), it is clear that those in the RHS reduced

their depression symptomology to a level more closely matched to those in the comparison group. As expected, there were still differences in depression symptomology, with RHS participants demonstrating increased difficulty managing their emotion regulation and distress tolerance. The goal of the study was to have those in the RHS report experiences demonstrating increased functioning in their abilities to manage emotion regulation via reduced depression symptomology.

In examining the differences following the intervention for those in early substance use recovery, we were interested if participants who reported parental substance use would report increased in depression symptomology compared to those who did not report parental substance use. Similar to the research, which indicates the lasting impact that family relationships can have on youth, specifically parents' substance use, those who indicated parental substance use continued to have increased depression symptomology following the six-week intervention (Walden et al., 2007). RHS participants reported reduced depression symptomology overall, however those with parental substance use reported increased symptomology than those without. This indicates need for further clarification of what interventions are most helpful for the subgroup of adolescents whose parents use substances.

Limitations and Implications for Future Research

There are several things that limit the generalizability, or challenge the validity of these results. Threats to internal validity, specifically experimental mortality, are present due to the dropout of four students in the RHS during the six-week intervention as a result of lapse in their sobriety. This reduced the already small sample size from 27 to 23 participants for the post-test analyses of those in early recovery. Threats of external validity are present in the current study due to the sample of recovery participants being drawn from one specific RHS. This threat

presents a possible compromise in our confidence of this study's results being applicable to other groups due to the specific recovery climate and culture present in this RHS. In particular, the requirement of this particular RHS of 30 days abstinence prior to enrollment, as compared to other programs only requiring a commitment to harm reduction. Limits to generalizability include the small sample size of the specific RHS from which the participants were recruited, for the findings cannot be generalized to the recovery population as a whole. Larger samples would be more adept at demonstrating possible effects of DCF involvement and parental substance use. Another limitation is the use of contextual factors as proxy measures in the study. Participants reported on their known parental substance use, but it is unlikely their reports are 100% accurate, a stronger commentary would be possible if the parents reported their use directly. Also, DCF involvement was indicated as a yes/no question, which doesn't provide any context around the nature, timing, duration or intensity each opened case. Additionally, future studies could incorporate multiple recovery high schools and a range of treatment approaches, such as family based therapies, to better address depression symptomology and family contextual factors (i.e. DCF involvement and parental substance use) that impact adolescents in early substance use recovery.

Implications for future research suggest interventions that are able to target the specific depression symptomology of adolescents in early substance use recovery, specifically in regards to their distress tolerance and emotion dysregulation. Future studies would benefit from a focus on increasing distress tolerance, and reducing emotion dysregulation demonstrated by adolescent's depression symptomology. Possible strategies to address this process are through additional mindfulness-based coping skills interventions. Interventions could include DBT, to address coping strategies for depression symptomology and emotion regulation, with strong

implications for the improvement of social context support (Cohen et al., 2003). Additionally, implications are present for different evidence-based treatments for youth in recovery to improve their emotion regulation and sobriety duration. Cognitive behavioral therapy (CBT) is an evidence-based treatment that has shown to be effective for substance use treatment. Waldron and Kaminer (2004) reported on individual and group improvements for CBT treatment focusing on identifying and understanding circumstances that trigger youth to use substances, specifically those related to social setting. Another evidence-based treatment that is effective for substance use treatment is mindfulness-based relapse prevention (MBRP) efforts. Studies have shown the effectiveness of MBRP for those in early substance use recovery when focusing on how to better identify triggers and cope with cravings. The hope is to increase awareness of thoughts, emotions and relevant environments to work towards avoiding relapse (Amaro, Spear, Vallejo, Conron, & Black, 2014; Bowen, Chawla, Collins, Witkiewitz, Hsu, and Grow, 2009; Witkiewitz, Marlatt, & Walker, 2005).

Future research should also include a goal of engaging family, with the aim of improving overall family functioning. Specifically, addressing parental substance use and high-risk behaviors to provide positive supports and protection for at-risk youth (Gruber & Taylor, 2008). Finally, the current study most importantly indicates a need for future research to focus on understanding how comorbid depression affects youth's ongoing substance use treatment and subsequent treatment outcomes (Hersh et al., 2014). As such, research efforts should focus on addressing depression symptomology early in the treatment program, examining the nature and duration of DCF involvement and environmental factors, including parental substance use.

Overall, this study provides preliminary data indicating adolescents in early SUD recovery demonstrate increased depression symptomology and emotion dysregulation compared

to a non-treated comparison group, which is associated with reported parental substance use, and DCF involvement. Research supports evidence of a relationship between high-risk familial factors, including parental substance use, and adolescent early engagement in substance use as a means to manage distress (Auerbach et al., 2009; Gruber & Taylor, 2008). Results from the DBT-inspired mindfulness-based coping skills intervention indicate that participants in early SUD recovery began to show reduced depression symptomology and increased abilities to effectively manage their emotions and distress. As such, evidence-based recommendations can be made for early substance use treatments to provide a significant focus on mood regulation, such as CBT or MBRP (Amaro et al., 2014; Bowen et al., 2009; Witkiewitz, Marlatt, & Walker, 2005; Waldron & Kaminer, 2004). In conclusion, our results support the use of mindfulness-based interventions to address depression symptomology indicative of emotion dysregulation for youth in early substance use treatment.

Table 1: Demographic Information

Variables	RHS(N=27)		Comparison(N=29)
	μ (SD)		μ (SD)
Age	17.26 (1.48)		17.55 (2.03)
Length of Sobriety	6.04 (6.04)		0.39 (0.52)*
	n (%)		n (%)
Ethnicity			
Caucasian	17 (63%)		23 (79.31%)
Hispanic	5 (18.5%)		3 (10.34%)
Asian	1 (3.7%)		-- (--)
African American	2 (7.4%)		3 (10.34%)
Other	2 (7.4%)		-- (--)
Legal Guardianship			
Single Parent	11 (40.74%)		6 (20.69%)
Joint Parent	8 (29.6%)		22 (75.86%)
Foster/Grandparent	2 (7.4%)		-- (--)
Non-Parental	5 (18.5%)		1 (3.44%)
DCF Involvement	14 (51.9%)		2 (6.89%)
Parental Hx Substance Use			
Alcohol	11 (40.7%)		18 (62.07%)
Marijuana	2 (7.4%)		3 (10.34%)
Prescription Pills	1 (3.7%)		2 (6.89%)
Heroin	1 (3.7%)		-- (--)
Cocaine/Crack	1 (3.7%)		-- (--)
Unknown	11 (40.7%)		10 (34.48%)
Overall Use	15 (55.5%)		19 (65.5%)
Adolescent Substance Use			
Cigarettes	14 (51.9%)		7 (24.1%)
Alcohol	17 (63%)		16 (55.17%)
Marijuana	20 (74%)		7 (24.14%)
Prescription Pills	10 (37%)		-- (--)
Heroin	10 (37%)		-- (--)
Cocaine	8 (30%)		1 (3.44%)
Methamphetamines	7 (26%)		1 (3.44%)
Hallucinogens	1 (3.7%)		-- (--)
	μ (SD)	μ (SD)	μ (SD)
	Initial	Post-Test	Initial
	Assessment		Assessment
CES-D	26.96 (13.44) (%)	21.52 (14.07) n (%)	12.69 (8.31) n (%)
Depression Symptomology			
Above Clinical Cut-off	19 (70.4%)	12 (52.2%)	11 (38%)

*Includes only adolescents indicating using substances in their lifetime, 6(20.69%) never used a substance

Table 2: Stepwise Linear Regression Model

	B (SD)	Beta
DCFInvolvement	-13.22 (3.59)	-0.46**
ParentalHxSUD	-1.845 (3.32)	-0.069
R ²	.204**	
F	6.777**	

*p<.05; **p<.01

Table 3: Independent Samples T-Test for DCF Involvement Depression Symptomology at Initial Assessment

Variables	DCF Involvement	
	<i>t</i>	<i>df</i>
CES-D	3.663**	54

* $p < .05$; ** $p < .01$

Table 4: Independent Samples T-Test by Cohort

Variables	Comparison/RHS Initial Assessment	
	<i>t</i>	<i>df</i>
CES-D	4.82**	54

*p<.05; **p<.01

Table 5: Paired-Samples T-Test for RHS at initial assessment/post-test

Variables	<i>t</i>	<i>df</i>
CES-D	2.358*	22

*p<.05; **p<.01

Table 6: Independent Samples T-Test by Known Parental Substance Use and CES-D at Post-test for RHS sample

Variables	Known parental substance use	
	<i>t</i>	<i>df</i>
CES-Dpost	-1.055*	21

*p<.05; **p<.01

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