

THESIS

MOURNING AND MARIJUANA: EXPLORING THE RELATION BETWEEN CANNABIS  
AND GRIEF AMONG COLORADO COLLEGE STUDENTS

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## ABSTRACT

### MOURNING AND MARIJUANA: EXPLORING THE RELATION BETWEEN CANNABIS AND GRIEF AMONG COLORADO COLLEGE STUDENTS

Emerging adults consistently report the highest rates of cannabis use globally. Although cannabis is often used to manage distress, coping-motivated use is linked to worsened mental health outcomes, including increased risk for cannabis use disorder (CUD). However, grief as a predictor of cannabis use is underexplored. Prolonged Grief Disorder (PGD) and grief rumination are increasingly recognized as distinct yet interrelated risk factors for psychological impairment. Emotion dysregulation may further exacerbate maladaptive coping tendencies, including substance use. This study investigated whether grief symptoms and grief rumination predict cannabis use frequency and CUD symptoms and whether emotion regulation difficulties moderate these relations. Participants ( $N = 923$ ;  $M_{age} = 19.27$ ,  $SD_{age} = 2.61$ ) were recruited from introductory psychology courses and completed validated self-report measures of grief (PG-13-R), grief rumination (UGRS), cannabis use (past 30-day use, CUDIT-R), emotion dysregulation (DERS), and cannabis use motives (MMQ). Poisson regression and interaction models were used to test hypothesized relations. Direct effects revealed that while prolonged grief and grief rumination did not significantly predict 30-day cannabis use frequency, elevated grief variables positively predicted increased CUD symptoms at the bivariate level. Further, grief significantly interacted with emotion dysregulation to predict cannabis outcomes. Specifically, individuals with high grief and high emotion dysregulation reported significantly greater cannabis use frequency and CUD symptoms. Marginal effects plots confirmed that grief-related

cannabis use was most pronounced among individuals with the greatest emotion regulation difficulties. Results offer novel evidence that grief-related distress predicts more problematic cannabis use patterns in emerging adults—and this relation changes as a function of emotion regulation capacity. The results underscore the potential utility of employing emotion regulation skills in coping with bereavement and suggest a need to address grief as a contributing factor to substance misuse.

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## INTRODUCTION

### **Cannabis Use in Emerging Adults**

*Prevalence and trends.* The 2022 U.S. National Survey on Drug Use and Health reported that 38.2% of individuals aged 18 to 25 used cannabis in the past year, marking the highest prevalence of cannabis use among all age groups (Substance Abuse and Mental Health Services Administration [SAMHSA], 2023). This represents an increase from previous years, indicating a rising trend in cannabis use within this already saturated demographic. Internationally, researchers observe similar patterns in that Canadian young adults have also exhibited higher cannabis use rates compared to older age groups (Government of Canada, 2017).

*Cannabis use risks.* The escalation in cannabis use among young adults raises significant public health concerns, as frequent and heavy cannabis use has been reliably established as predictive of various adverse outcomes such as cognitive impairments, poorer academic performance, and the development of pathological patterns of cannabis use-- termed Cannabis Use Disorder (CUD; APA, 2022; Robinson et al., 2022). While the literature remains mixed, there is a growing body of evidence indicating that daily or near-daily cannabis use over time can increase mood-related mental health symptoms such as anxiety and depression (Moreno-Mansilla et al., 2021). Further, studies of chronic use suggest that prolonged cannabis use may negatively impact the brain's limbic system, leading to feelings of fatigue, low mood, and decreased motivation (Hammond et al., 2022). Though support remains mixed in terms of adverse mental health impacts, it is reasonable to suspect that such adverse impacts may subsequently exacerbate difficulties in emotion regulation processes and coping mechanisms among young adults.

## **Cannabis Use Disorder and Risk in Grieving Populations**

*Cannabis use disorder (CUD).* Cannabis Use Disorder (CUD) is presently characterized by persistent, maladaptive patterns of cannabis use that result in significant impairment across social, occupational, or academic domains (APA, 2022). The Cannabis Use Disorders Identification Test-Revised (CUDIT-R; Adamson et al., 2010) operationalizes problematic use by assessing frequency, quantity, and functional interference. Although in recent approximations, only 21% of young adults reported any past-month cannabis use, approximately 11% of those individuals met criteria for past-year CUD, suggesting a substantial proportion of young cannabis users subsequently experience cannabis-related problems (Kerr et al., 2023). This elevated proportion highlights the need to understand risk factors for CUD, particularly within psychologically vulnerable subgroups such as those experiencing grief.

*Coping and motives for cannabis use.* Understanding why emerging adults use cannabis is critical; research indicates cannabis is frequently used as a "stress-coping" strategy, with stress and negative emotion coping as key motives for cannabis use (Buckner et al., 2017; Bonn-Miller et al., 2007). Emerging adults experiencing high stress or trauma may turn to cannabis for relief, initiating a potentially maladaptive coping cycle (Hyman & Sinha, 2009). This context sets the stage for examining specific stressors or emotional challenges (like bereavement) that might drive cannabis use in this population.

Cannabis is frequently linked to coping behavior (i.e., "self-medicating") in response to distressing emotional states, particularly among individuals with heightened stress or emotional vulnerability (Buckner et al., 2017; Bonn-Miller et al., 2007). Although no known studies have directly examined the relation between grief and cannabis use, both constructs are independently associated with poor mental health outcomes (Pearson, 2018; Parisi et al., 2019). Prior research

suggests that individuals grieving a significant loss often engage in both behavioral activation and avoidance strategies (Stroebe et al., 2010), with some relying on external forms of coping—such as substance use—to manage grief-related emotions (Mancini et al., 2009). Given this, it is reasonable to hypothesize that some bereaved individuals may use cannabis as a form of avoidant coping.

Emotion regulation appears to be a shared mechanism underlying both grief and substance use behaviors. Individuals with greater difficulties in emotion regulation tend to report more frequent cannabis use (Hussong et al., 2017; Stellern et al., 2023). In clinical populations, the association between heightened anxiety and cannabis use has been shown to operate through increased endorsement of coping motives and greater dysregulation (Buckner et al., 2017). Grief literature presents parallel findings suggesting that individuals who meet newly modernized diagnostic criteria for Prolonged Grief Disorder (PGD; APA, 2022) frequently report reduced emotional clarity, psychological flexibility, and self-efficacy in coping skills (Gupta & Bonanno, 2011).

Together, this evidence suggests a convergence of risk pathways—whereby heightened grief, impaired emotion regulation, and reliance on cannabis as a coping strategy may interact to increase vulnerability to CUD in emerging adults. Specifically, cannabis may be used to disrupt or dampen emotional dysregulation, either by numbing distress or enhancing mood. The growing perceptions of legitimacy in medical cannabis use—particularly in managing anxiety and trauma—has likely contributed to public beliefs that cannabis may support emotional regulation during periods of intense stress. For those who have experienced mood improvement from cannabis in the past, such use may evolve into coping-oriented patterns, particularly when internal emotion regulation resources are strained. Although coping motives are consistently

linked to problematic use and greater CUD risk (Bujarski et al., 2012), emerging evidence suggests that some individuals may experience short-term benefits from acute cannabis use, such as increased mindfulness or affective acceptance, though it remains unclear for whom, and under what conditions, this may be the case (Cavalli et al., 2025). Resource depletion models (Baumeister et al., 2000) may help explain this variability: when regulatory resources are low due to chronic emotional strain, individuals may increasingly rely on external tools like cannabis to manage distress. These complex and person-dependent processes highlight the need for more nuanced research into the conditions under which cannabis use during grief is helpful, harmful, or both. The current study builds on these findings by examining how these constructs interrelate, intending to inform more practical areas of prevention and intervention strategies for this at-risk population.

### **Historical and Theoretical Foundations of Early Grief Models**

The conceptualization of pathological grief has evolved significantly over the past century in terms of clinical criteria and research perspectives on bereavement. Freud (1917) was among the first to distinguish between grief and depression and described mourning as a normal response to loss, as opposed to melancholia, defined as a pathological state in which the ego becomes consumed by the loss, leading to depressive symptoms.

Building on Freud's distinction, Kübler-Ross (1969) introduced the now widely known five stages of grief—denial, anger, bargaining, depression, and acceptance—originally conceptualized through her work with terminally ill patients. Although initially conceptualized as linear and sequential, Kübler-Ross and subsequent researchers (Bonanno, 2004; Stroebe et al., 2010) later acknowledged that these emotional stages do not occur universally or in a rigid order.

The enduring cultural impact of this model speaks to how grief is generally understood as a nonlinear, emotionally nuanced process.

Several models have since expanded on this foundation. Worden's (1982) Four Tasks of Mourning emphasized a goal-directed process that includes accepting the reality of the loss and re-establishing emotional life. Rando's (1993) "Six R's" of mourning emphasized both emotional and cognitive processes and introduced the concept of "complicated grief," which is now reflected in the modern diagnostic criteria for PGD. The Continuing Bonds model (Klass et al., 1996) then challenged the idea that emotional resolution requires detachment and suggested the supportive utility of maintaining symbolic ties to the deceased. Similarly, the Grief Recovery Method (James & Friedman, 1998) is the importance of active emotional engagement and behavior change in symptom management.

The Dual Process Model (Stroebe & Schut, 1999) reframed grief as a dynamic oscillation between loss-oriented and restoration-oriented coping, integrating earlier theories of emotion-focused processing with practical life adjustment. Specifically, the DPM posits a similar balance between engagement with emotions and restorative breaks that mirrors effective emotion regulation processes (Brodbeck et al., 2022). This link is further underscored in the work of Eisma and Stroebe (2021), which establishes a relation between adaptive emotion regulation skills and improved grief prognosis.

Finally, Bonanno et al. (2002) highlighted variability in individual grief trajectories, identifying "resilient" patterns and emphasizing the role of personal emotional resources. The longitudinal research of Bonanno and colleagues (2002) demonstrated the broad variability in individual grief responses over time, which challenged traditional stage-based models by documenting five distinct trajectories of grief and depression symptoms following bereavement.

Most notably, they identified a "resilient" group—which stood in contrast to the more widely assumed "common grief" pattern involving peak symptoms around six months. Importantly, their findings demonstrated that not all individuals experience high levels of grief or follow a uniform course. Further, lower self-reported emotion regulation skills were uniquely predictive of whether or not individuals were more likely to develop PGD symptoms, emphasizing the utility of internal coping resources in differentiating normative from maladaptive grief outcomes.

Together, these models demonstrate that grief is a multidimensional experience involving emotional/cognitive processing and approach/avoidance behaviors. Individual differences—especially in emotion regulation and avoidance tendencies—shape how grief unfolds (Gupta & Bonanno, 2011; Eisma et al., 2013). These frameworks inform the present study's approach to assessing grief as both a symptom-based syndrome (PGD) and as a cognitive-emotional process (Rumination) and support the inclusion of emotion dysregulation as a vulnerability factor for maladaptive coping outcomes, including substance use.

### **Prolonged Grief and Grief Rumination as Distinct Constructs**

*History of grief diagnostics.* The field of psychology has only recently established functional diagnostic criteria for the diagnosis of pathological grief, termed PGD (American Psychiatric Association, 2022). Prior to the definitional changes of grief within the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) (5th ed., text rev.; DSM-5-TR; American Psychiatric Association, 2022), much of the existing grief research conducted used existing measures of the associated construct previously mentioned, complicated grief (Rando, 1993). Complicated grief here is defined as the result of bereavement that falls outside sociocultural norms in terms of duration and/or intensity and is associated with low self-esteem, decreased sleep, low quality of life, adverse changes in eating and tobacco smoking habits,

hypertension, and an increased risk for suicidal behaviors (Masferrer et al., 2017a; Parisi et al., 2019).

The diagnostic criteria for PGD were established in the latest release of the DSM after decades of disagreement between prominent research groups led by Prigerson (1997), who studied grief under the label of "traumatic grief," and Shear (2005), who defined the construct "complicated grief." The disagreements between groups regarding the name and the definition of pathological grief led to several well-developed branches of grief research that are difficult to compare (Maciejewski et al., 2016; Zachar, 2023). As a result of these definitional disagreements, our understanding of pathological grief has undoubtedly been impeded, especially when compared to the cohesion of trauma research over time.

*Prolonged grief disorder.* PGD, as presented in the newly revised Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR, 2022), is defined by the enduring and intense grief experienced following the death of a close individual, persisting for over twelve months in adults and six months in adolescents or children. Characterized by symptoms of profound yearning for the deceased and/or a preoccupation with their memory, symptoms of PGD include persistent longing or fixation on the loss manifest almost daily, particularly intensifying over time. To qualify for a PGD diagnosis, individuals must also exhibit at least three of the following symptoms in addition to intense longing to a significant degree: feeling as though part of oneself has died, pronounced disbelief about the death, avoidance of reminders of the deceased, emotional pain such as anger or sorrow, difficulties in resuming social and personal activities, emotional numbness, feelings of life being meaningless, and intense loneliness (APA, 2022).

More recent research highlights the high prevalence and clinical relevance of Prolonged Grief Disorder (PGD), particularly among youth and emerging adults. Although U.S.-specific estimates are still emerging, earlier figures suggested that 18% of bereaved youth met the pre-diagnostic criteria for the former designation, Persistent Complex Bereavement Disorder (APA, 2022). More recent meta-analyses place adult PGD prevalence around 9.8% (Lundorff et al., 2017), with significantly higher rates—up to 49%—among individuals grieving unnatural losses such as death by suicide or accident (Djelantik et al., 2020). For children and adolescents, prevalence estimates range from 10.4% to 32% (Falala, 2024), suggesting that some younger populations may be at risk. Additionally, Wilson et al. (2018) reported that 96% of U.S. adults endorsed having experienced a grief reaction at some point in their lifetime. In addition, the results indicated an average of five grief-related experiences across the lifespan among participants. The above findings underscore the relevance of PGD to the public health of emerging adults and necessitate an improved understanding of relevant psychological correlates and outcomes.

*Grief-related rumination.* The related construct of grief rumination is defined as a cognitive process of repetitive, self-focused thinking about the loss, its causes and consequences, and one's grief reactions (Eisma et al., 2015). Rumination is distinct from PGD but contributes to its maintenance (Eisma & Stroebe, 2017). This ruminative process may manifest as an individual dwelling on "Why did this happen?" or reliving the circumstances of the death. Such rumination is conceptually related to (but separate from) generalized depressive rumination – it is specific to bereavement content. Importantly, grief rumination is associated with poorer adjustment in that it may negatively influence bereavement outcomes by fueling persistent distress. Further, grief

rumination is associated with poorer bereavement outcomes, including greater depression and emotional avoidance (Eisma et al., 2013; Boelen et al., 2006).

*Rationale for separate inclusion.* While prolonged grief and grief-specific rumination often co-occur, they represent different aspects of the grief experience. PGD encapsulates a broad syndrome (intense yearning, identity disruption), whereas rumination is a potential mechanism driving that syndrome. Previous literature has identified rumination as a maintaining factor for prolonged grief – studies show it contributes to the persistence of complicated grief symptoms (Eisma et al., 2015). Further, rumination may drive prolonged grief but can also occur independently. Some individuals who engage in increased grief-related rumination may not meet PGD criteria yet still experience functional impairment (Eisma & Stroebe, 2017). This distinction means that not everyone with high rumination meets full PGD criteria, and by including both constructs, this study can potentially disentangle their unique effects.

### **Emotion Dysregulation and Its Role in Substance Use**

*Defining difficulties with emotion regulation.* Difficulties with emotion regulation are defined as persistent challenges in understanding, expressing, or managing emotional responses. Conceptually, emotion dysregulation may encompass problems with understanding emotions, issues controlling impulsive behaviors when distressed, and may precede the use of inappropriate strategies to modulate emotional intensity (Gratz & Roemer, 2004). In contrast, healthy emotion regulation means one can flexibly up- or down-regulate feelings in contextually adaptive ways. Gross (1998) defines emotion regulation as the processes by which individuals influence the aspects of their emotional experience. Emotion dysregulation often occurs when this modulation of emotional experience and expression to fit goals and context breaks down – and emotions may become overwhelming, prolonged, or poorly controlled.

*Emotion dysregulation as a risk factor for substance use.* As has been robustly demonstrated in mental health literature, Individuals high in emotion dysregulation often use substances to manage distress, and these individuals may demonstrate greater substance use severity and risk for more problematic patterns of substance use (Weiss et al., 2023). Intuitively, substance use may serve as an immediate (but ultimately maladaptive) coping strategy to aid individuals in regulating heightened emotions. Previous literature has established cannabis use as a commonly endorsed form of emotion regulation among those with affective or trauma-related disorders (Hammoniere et al., 2022; Zimmerman et al., 2017; Buckner et al., 2017). One study found that emotional dysregulation moderates the stress–substance use relation, heightening the risk for substance use-related problems (Hussong et al., 2011). Taken together, when emotions feel unmanageable, substances offer an alluring escape, reinforcing use and heightening addiction risk.

*Emotion dysregulation in grief processing.* Emotion regulation or dysregulation is also critical in how one copes with bereavement. Grief is an intense emotional experience in that sadness, anger, and loneliness can come in overwhelming waves (Djelantik et al., 2022). Those with adaptive emotion regulation skills might confront these feelings gradually and seek support or use healthy coping strategies. In contrast, a bereaved person high in emotion dysregulation may either become highly dysregulated by grief emotions or desperately avoid them, both of which can impair adaptation. The earliest conceptual models of grief, such as the Kübler-Ross Model (1969), framed the grieving process as a linear sequence of five emotional stages: denial, anger, bargaining, depression, and acceptance. This model, based on work with terminally ill patients, significantly shaped public understanding of how individuals process loss. However, Kübler-Ross herself and later researchers (Bonanno, 2004; Stroebe et al., 2010) acknowledged

that grief does not always follow a fixed order—individuals may cycle through stages unpredictably or skip some altogether. Despite criticisms, the model remains influential and highlights the need for improved psychological flexibility and emotion regulation strategies in adaptively navigating grief.

Recent studies suggest that emotion regulation difficulties contribute to prolonged grief symptoms such that those with higher impulsivity and/or inattention to their emotions may struggle to integrate the loss, leading to persistent grief (Gupta & Bonanno, 2011). Maladaptive strategies like experiential avoidance or suppression of grief feelings can paradoxically prolong distress (Eisma et al., 2013). Notably, rumination itself is a form of maladaptive regulation (recycling painful thoughts and emotions without resolution) and is strongly implicated in perpetuating grief-related distress (Boelen et al., 2006). Overall, evidence suggests that emotion dysregulation may link grief to substance use by creating distress that the individual cannot handle adaptively, where cannabis might then be used as a compensatory emotion regulation tool when one's regulation capacity is overwhelmed by grief.

### **Guiding Theoretical Frameworks**

*Dual process model of grief.* A key grief theory guiding this study is the Dual Process Model (DPM) of coping with bereavement (Stroebe & Schut, 1999), which posits that healthy adaptation to loss involves oscillating between two modes: (1) *loss-oriented* coping – confronting the pain, emotions, and memories of the loss; and (2) *restoration-oriented* coping – focusing on life changes, new roles, and day-to-day tasks. Crucially, a bereaved individual should oscillate between these modes, approaching grief sometimes and intuitively taking breaks at other times to prevent emotional overwhelm. Difficulty balancing these processes may result in chronic avoidance (e.g., substance use) or emotional flooding (Stroebe et al., 2010). The

model emphasizes that both avoidance and confrontation have roles – but in balance. A person with poor emotion regulation might over-rely on avoidance (e.g., substance use or distraction) and under-engage in necessary grief work, risking prolonged grief. Thus, DPM provides a framework for why processing grief-related emotions is an important component of managing grief symptoms – aligning with my focus on emotion regulation difficulties.

*Cognitive-behavioral models of prolonged grief.* Cognitive-behavioral models of grief processing (Boelen, 2006; Stroebe et al., 2006) further elucidate how maladaptive thoughts and coping behaviors work to maintain prolonged grief. These models propose that following a loss, individuals who hold problematic beliefs (e.g., "I cannot live without my loved one" or self-blame for death) and engage in avoidance strategies are at the highest risk for persistent grief. Under these models, avoidance can be behavioral (avoiding reminders of the deceased or using substances to avoid feelings) or cognitive (suppressing thoughts or, conversely, ruminating in a way that avoids confronting the reality of the loss). One influential Cognitive-Behavioral model by Boelen (2006) and colleagues suggests that grief becomes "stuck" through a cycle of negative cognitions and avoidance: the individual never fully processes the loss, so the pain remains acute. In these frameworks, substance use is explicitly considered a potential avoidance coping mechanism that impedes emotional processing (Boelen et al., 2006). Further, the integrative risk factor model (Stroebe et al., 2006) identifies substance misuse as a risk factor for poor grief resolution. Conceptually, this may mean a bereaved individual who copes by drinking or using drugs may numb the pain temporarily but, in doing so, delay confronting the loss, setting the stage for prolonged grief. These theories underpin my hypothesis that grief-related distress can drive cannabis use as a form of avoidance coping, and although outside the scope of this study, this form of coping might exacerbate grief in a vicious cycle.

*Gross's Process Model of emotion regulation.* To contextualize the understanding of emotion dysregulation within the experience of grief, I drew on Gross's process model (1998), which similarly differentiates between adaptive (e.g., reappraisal) and maladaptive (e.g., suppression, avoidance) strategies. Gross delineates emotion regulation strategies by when they act in the emotion-generative process. This model highlights that some strategies are generally more adaptive than others – for instance, reappraising a distressing situation (reframing one's thoughts) tends to reduce negative emotion, whereas suppressing emotional expression after it arises often only masks the feeling and can increase physiological stress. In grief reactions, an adaptive antecedent-focused strategy might be seeking social support or finding meaning (to preempt overwhelming despair). In contrast, a maladaptive response-focused strategy might be drinking or using cannabis to blunt the emotional response once sorrow hits. Gross's framework helps explain individual differences in coping: a person with emotion regulation difficulties might rely on suppression or avoidance (maladaptive) rather than cognitive reframing or problem-solving (adaptive). Over time, habitual use of maladaptive strategies (like substance use or rumination) can worsen emotional outcomes. The process model thus informs our hypothesis that *how* someone manages their grief emotions (effectively vs. ineffectively) will influence whether they turn to substances. It also suggests that an interaction may occur: those with poorer regulation (e.g., more suppression, less reappraisal) could be especially prone to coping through cannabis use when experiencing intense grief. Further, while grief relates to an inherently unchanging variable (i.e., death), the study of emotion regulation concerning grief processing may imply potentially feasible avenues of intervention for those experiencing pathological grief.

## **Empirical Associations and Study Justification**

*Grief and substance use.* A growing body of evidence supports a positive relation between bereavement and increased substance use (Furr et al., 2015; Caparrós & Masferrer, 2021). Several studies have demonstrated that symptoms of grief are predictive of heightened use of substances such as alcohol, heroin, and nicotine (e.g., Kendler et al., 2002; Parisi et al., 2019). However, no known research to date has specifically examined how cannabis use changes in relation to grief experiences. This gap in understanding is concerning given that cannabis use and other risk-taking behaviors are most prevalent in emerging adults aged 18–25, a developmental period marked by increased vulnerability to both maladaptive grief experiences and substance use (SAMHSA, 2023).

The overlap between grief and trauma is particularly relevant. PGD has been linked to an increased risk of developing post-traumatic stress disorder (PTSD), and nearly half of the individuals with PGD may also meet the criteria for PTSD (Komischke-Konnerup et al., 2021). Given the strong empirical link between trauma and substance use (Jacobson et al., 2001), it is reasonable to suspect that pathological grief may similarly contribute to maladaptive substance use patterns.

Historically, much of the grief literature has excluded individuals with co-occurring substance use disorders (Parisi et al., 2019), limiting our understanding of this high-risk population. Existing studies that have included substance-using populations suggest an additive risk for adverse outcomes, including elevated psychiatric comorbidity, impaired daily functioning, and worsened treatment response (Masferrer et al., 2017a). Importantly, in one study comparing bereaved individuals with and without substance use disorders (SUD), 34.2% of the clinical SUD group met criteria for pathological grief, compared to only 5% of bereaved

individuals without SUD (Masferrer et al., 2017b). These findings underscore the potential clinical relevance of this intersection and justify further research into cannabis use among bereaved young adults.

Past research has also identified several key risk factors associated with losing a significant person (Buur et al., 2024). Unnatural losses (e.g., suicide, overdose) and the loss of close relations such as siblings or spouses are associated with greater grief severity and increased risk for substance use (Masferrer et al., 2017a). Moreover, individuals with both SUD and complicated grief report higher anxiety, poorer coping, and a greater likelihood of meeting the criteria for PTSD than those with either condition alone (Masferrer et al., 2015; 2016). Together, the above findings support the importance of examining grief as a predictor of substance use—especially cannabis use—within this population.

*Grief rumination.* Grief rumination, defined as repetitive, self-focused thinking about the loss and its emotional consequences, has emerged as a key cognitive process in the maintenance of prolonged grief. This construct was first empirically validated by Eisma and colleagues (2012; 2014), who developed the Grief Rumination Scale to measure patterns of intrusive, loss-related thoughts that extend beyond typical grieving. Unlike depressive rumination, grief-specific rumination captures loss-focused content, including anger, anxiety, and self-blame. Research shows that grief rumination predicts prolonged grief symptoms and explains more variance in grief outcomes than depressive Rumination (Eisma et al., 2017).

Rumination has been conceptualized not only as a marker of distress but also as a maladaptive emotion regulation strategy. Eisma et al. (2013) found that experiential avoidance mediates the relation between grief rumination and prolonged grief symptoms, suggesting that

rumination may perpetuate grief by promoting behavioral disengagement from the emotional experience of loss.

Importantly, this cognitive vulnerability may extend beyond its role in grief maintenance. Given the strong associations between rumination and maladaptive coping, it is plausible that individuals high in grief rumination may turn to external regulation strategies—such as cannabis use—to suppress or avoid painful cognitions. Although this link lacks previous empirical support in the context of bereavement, research in depression and anxiety has shown that rumination predicts substance use, reinforcing its relevance here.

*Emotion dysregulation and cannabis use.* Emotion dysregulation—the inability to monitor, evaluate, and modify emotional states in contextually appropriate ways—is a well-established transdiagnostic risk factor for psychopathology, including substance use (Gratz & Roemer, 2004; Weiss et al., 2023). Cannabis is previously established as a frequently used means of short-term affect regulation among individuals with emotion regulation difficulties, particularly those with affective or trauma-related disorders (Buckner et al., 2017). In a key study by Hussong et al. (2011), emotion dysregulation moderated the link between life stress and cannabis problems, such that the association was significantly stronger for individuals with elevated regulatory difficulties.

The relation between emotion dysregulation and cannabis use appears particularly pronounced in emerging adults. This group is not only developmentally more vulnerable to emotion regulation difficulties but also more likely to use cannabis as a coping strategy (Bonn-Miller et al., 2007). This emotional vulnerability may create the conditions for cannabis to be subsequently utilized as an external regulator for unmanageable grief-related effects, especially in the absence of more adaptive strategies.

*Integrating prior findings.* Few studies have concurrently examined grief, emotion dysregulation, and cannabis use patterns, yet available literature points to possible interconnectedness. Although support is not yet specific to cannabis users, bereaved individuals—particularly with prolonged grief reactions—are at elevated risk for substance misuse. Grief rumination may also exacerbate emotional distress and precede avoidant strategies such as cannabis use, especially in those with limited access to internal coping resources. Individuals diagnosed with PGD who have elevated difficulties with emotion regulation and report greater interpersonal problems and cognitive inflexibility than healthy controls (Jeffreys, 2005; Harrison, 2022). Additionally, severe grief reactions predicted higher rates of anxiety and depression, were negatively associated with self-reported physical health, and were positively associated with the use of health services (Thimm, 2022).

Together, findings suggest a convergence of adverse health risk associations in bereavement, ruminative thinking, and difficulties with emotion regulation among emerging adults, and potentially highlights a particularly high-risk group for substance misuse. This model aligns with the self-medication hypothesis and existing grief frameworks, such as the Dual Process Model and cognitive-behavioral theories of prolonged grief. These theories emphasize the role of avoidance—both emotional and behavioral—in the maintenance of grief and highlight how substance use may interfere with adaptive grief resolution (Stroebe et al., 2010; Boelen et al., 2006).

The present study aimed to empirically test this theoretical intersection by examining whether grief symptoms and grief rumination predicted cannabis use outcomes in a young adult population-- and whether emotion dysregulation moderated these relations. The results of this study aim to address an existing gap in the present research and could potentially be used to

inform future intervention development efforts by gaining clinically relevant insights into processes that maintain grief and substance use disorder-related distress.

### **Gaps in Literature**

*Lack of integration in grief and Substance use research.* Despite growing recognition that bereavement can have profound psychological and behavioral impacts, research in grief and SUD has evolved primarily in parallel rather than in tandem. Most empirical studies on grief have focused on mood, anxiety, and trauma-related outcomes. At the same time, research on substance use has tended to generalize "stressful life events" rather than isolating bereavement-specific distress. As a result, the nuanced ways in which grief may contribute to substance use—particularly cannabis use—remain underexplored. A 2019 systematic review described the link between complicated grief and substance misuse as "poorly understood" and emphasized the need for research clarifying these associations (Parisi et al., 2019). The present study helps address this gap by cross-sectionally investigating the influence of grief and grief-related cognition on cannabis use in a bereaved emerging adult sample.

*Limited quantitative studies on grief–substance use interactions.* The majority of existing quantitative literature examining grief and substance use is correlational and often relies on binary diagnostic outcomes rather than capturing the true range of symptom severity more broadly. Very few studies have employed multivariate models that test interaction effects or examine how individual difference factors (e.g., emotion regulation, cognitive coping style) may condition the relation between grief and substance use. Without testing moderation effects, it is challenging to identify subgroups most at risk or determine whether specific traits exacerbate the effects of grief on substance involvement. This study advances the literature by explicitly testing whether emotion dysregulation moderates the link between both prolonged grief and grief

rumination with cannabis use outcomes. The employed analyses allow for a more nuanced understanding of how bereavement-related distress may differentially impact patterns of substance use across individuals-- regardless of whether they meet the criteria for a diagnosis of PGD or CUD. Not only will this broader scope capture a wider range of grief experiences than previous binary models, but this also creates increased generalizability to those who may not receive a diagnostic label but are suffering to some degree, nonetheless.

*Emerging adults in the modern cannabis landscape.* Emerging adulthood (ages 18–25) is a developmental period known for heightened emotional lability and risky behavior, including experimentation with substances (Nelson, 2021). As stated previously, this age group consistently reports the highest rates of cannabis use in the United States, with recent national surveys estimating that over 40% of young adults used cannabis in the past year and approximately 11% engage in daily or near-daily use (SAMHSA, 2023). At the same time, PGD prevalence appears notably elevated in youth and young adult populations (Falala, 2024; APA, 2022). However, bereavement-related research has rarely centered on this developmental stage, nor has it adapted to the modern cannabis landscape—including higher potency products, increased accessibility through legalization, and changing social norms around use. The present study situates itself within this contemporary context by focusing exclusively on emerging adults and cannabis-related outcomes, thereby addressing a pressing public health need.

## **Research Questions**

Based on the previous research, the following research questions and hypothesis were investigated in the present study:

*Question 1.* Is there a relation between the experience of grief and patterns of cannabis use in individuals who have endorsed past cannabis use and have experienced a significant personal loss?

*Question 2.* Does the intensity of an individual's grief symptoms and/or grief rumination predict increased cannabis use frequency and cannabis use disorder symptoms in those who use cannabis and have experienced a significant personal loss?

*Question 3.* Is the relation between grief and cannabis use different for individuals (i.e., with cannabis use and personal loss experience) who endorse high difficulties with emotion regulation, as opposed to average or low difficulties with emotion regulation?

## **Hypotheses and Aims**

*Aim 1.* Assess whether there is support of significant positive correlations between measures of grief, cannabis use, and emotion dysregulation.

*Hypothesis 1.* Individuals who endorsed experiencing greater grief-related symptoms would report significantly higher grief rumination, increased past 30-day cannabis use frequency, greater difficulties with emotion regulation, and elevated engagement in problematic cannabis use compared to individuals who did not endorse experiencing grief.

*Aim 2.* Identify whether there is a significant predictive role of grief symptoms and/or grief rumination in cannabis use frequency and hazardous cannabis use behaviors.

*Hypothesis 2.* There would be a positive predictive relation between grief symptom intensity and patterns of cannabis use such that greater symptoms of grief would predict greater cannabis use frequently and more problematic cannabis use.

*Hypothesis 3.* There would be a significant positive predictive relation between grief rumination and patterns of cannabis use such that greater grief rumination would predict greater cannabis use frequency and more problematic cannabis use.

*Aim 3.* Establish whether emotion regulating difficulties significantly change the relation between grief and patterns of cannabis use (i.e., cannabis use frequency and symptoms of cannabis use disorder).

*Hypothesis 4.* Among participants with high emotion regulation difficulties, there would be a strong significant positive effect of grief symptoms on cannabis use frequency and hazardous cannabis use. Among participants with average emotion regulation difficulties, this effect would be significant but weaker, and it would be nonsignificant among those with low emotion regulation difficulties. This interaction pattern would be the same when using grief rumination as the predictor.

## METHODS

### Participants and Procedures

Participants ( $N = 3,722$ ) were aged 18 and above and enrolled in undergraduate psychology courses at Colorado State University who give class credit for research participation at the time of survey completion and were recruited during the Fall 2022 and 2023 semesters using the Department of Psychology Research Pool. Per the research disclosure guidelines set by Simmons et al. (2011), I decided to cease data collection at the end of each semester. Students earned class credit in exchange for participating in a survey on cannabis use and their experience of grief.

### Measures

*Prolonged Grief Disorder Inventory-Revised (PG-13-R)*. To assess both the presence and severity of Prolonged Grief symptoms, I used the Prolonged Grief Scale (PG-13-R; Prigerson et al., 2021), a 13-item item measure based on the DSM-5-TR diagnostic criteria for PGD (APA, 2022). The first two items on the PG-13-R captured the endorsement of a grief-related event and the months that elapsed since that event occurred. Participants then answered items 3-12 using a 5-point Likert scale (ranging from 1: “Not at all” to 5: “Overwhelmingly”) with total scores over 30 indicating that the individual meets the criteria for PGD. Three concurrent studies were conducted and found converging evidence of internal consistency among item responses in each sample (i.e.,  $\alpha = .83$  for Yale,  $\alpha = .90$  for Utrecht,  $\alpha = .93$  for the Oxford study). The PG-13-R demonstrated excellent internal consistency in the present sample ( $\alpha = .93$ ).

*Utrecht Grief Rumination Scale*. Participants completed the Utrecht Grief Rumination Scale (UGRS; Eisma et al., 2014), a 15-item, 5-point Likert Scale (ranging from 1: “never,” 5:

“very often”) containing five different subscales of thoughts about the meaning of the loss, thoughts about social support, what-if questions, why questions, and thoughts and feelings. Scores may range from 15-75, with higher scores indicating a greater disturbance of ruminative, grief-related thoughts. The UGRS has shown excellent internal consistency in both English ( $\alpha = 0.90$ ) and Dutch ( $\alpha = 0.91$ ) samples (Eisma, 2014). In the present study, the UGRS showed excellent ( $\alpha = .95$ ).

*Past 30-Day Cannabis Use Frequency.* To assess 30-day cannabis use frequency, respondents reported the number of days they used cannabis in the past 30 days, with possible scores ranging from 0 to 30. This self-report measure is widely used in research to quantify recent cannabis consumption, and its validity has been repeatedly supported by studies such as Schluter and Hodgins (2022), who developed the Cannabis Engagement Assessment (CEA), a self-report measure focusing on past-month cannabis use across various product types. The CEA demonstrated good convergent validity with established measures of cannabis use patterns and related problems, supporting the reliability of frequency-based assessments for capturing recent cannabis use.

*Cannabis Use Disorders Identification Test-Revised (CUDIT-R).* To assess cannabis use severity, participants completed the CUDIT-R, an 8-item self-report screening measure designed to assess for potential harmful use of cannabis (Adamson et al., 2010). Scores at or above 8 suggest hazardous cannabis use, and scores at or above 12 suggest respondents’ cannabis use is significant enough to warrant a diagnosis and intervention. The CUDIT-R has been shown to have a high degree of internal consistency ( $\alpha = 0.84$ ; Adamson et al., 2010). The CUDIT-R exhibited good internal consistency in this study ( $\alpha = 0.87$ ).

*Difficulties with Emotion Regulation Scale (DERS-18)*. To measure an individual's perception of their emotion regulation skills, participants completed the Difficulties with Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), an 18-item self-report Likert scale that assesses how respondents relate to their emotions. Items response options range from 1 ("almost never [0-10%]") to 5 ("almost always [91-100%]"), such that higher scores indicate less emotional regulation. The DERS contains six validated subscales, including nonacceptance of emotional responses, difficulty engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. The DERS has been shown to have high validity and internal consistency ( $\alpha = .93$ ; Hallion et al., 2018). In the present study, the DERS showed excellent internal consistency ( $\alpha = .91$ ).

*Marijuana Motives Questionnaire (MMQ)*. To identify common motives for use, participants completed the Marijuana Use Motives Questionnaire (MMQ; Simons et al., 1998), a 25-item, 4-point Likert scale on which higher scores indicate more frequent motives for use. Within this measure are five validated factor loadings corresponding to subscales of motives: coping ( $\alpha = 0.89$ ), enhancement ( $\alpha = 0.92$ ), social ( $\alpha = 0.89$ ), conformity ( $\alpha = 0.82$ ), and expansion ( $\alpha = 0.93$ ). The MMQ demonstrated excellent internal consistency across its 25 items ( $\alpha = 0.94$ ) and the coping subscale also showed excellent reliability ( $\alpha = 0.91$ ).

## **Analyses**

To address my research aims and test study hypotheses, I employed a combination of descriptive, correlational, and predictive statistical strategies using R (Version 2023.12.0 + 369; R Core Team, 2024). I began by preparing the dataset, which included merging the two cohort data sets and filtering for participants who reported both lifetime cannabis use and a significant

personal loss ( $n=923$ ). I created composite variables for prolonged grief symptoms, grief rumination, emotion regulation difficulties, cannabis use disorder symptoms, and past 30-day cannabis use frequency. Prior to hypothesis testing, I conducted descriptive analyses to calculate means, standard deviations, and frequencies for all key variables. I assessed internal consistency using Cronbach's alpha for each composite measure and visualized the data via histograms to assess normality. As my outcome variables were non-normally distributed, I employed Spearman correlation coefficients, count regression models, and marginal moderation effects analyses to address the study aims.

*Analysis 1.* To address Aim 1, I calculated Pearson and Spearman correlation coefficients to examine the strength and direction of associations among grief-related constructs, cannabis use behaviors, and emotion regulation difficulties. These analyses established baseline relations between variables, which informed subsequent predictive models.

*Analysis 2.* To address Aim 2, I used Poisson regression models to assess whether prolonged grief symptoms and grief rumination significantly predicted past 30-day cannabis use frequency and symptoms of cannabis use disorder (CUD). While recommendations set by Baggio et al., (2017) advise against the use of Poisson regression in favor of Quasi-Poisson regression when modeling count data in substance using populations, the marginal effects visualization software used to address aim 3 necessitated base Poisson models. To account for these recommendations, I employed the use of both Poisson and Quasi-Poisson models to test direct effects (Baggio et al., 2017). Confidence intervals were interpreted with caution for Poisson models, consistent with known limitations under overdispersion (Baggio et al., 2018).

*Analysis 3.* To evaluate Aim 3, I examined whether difficulties in emotion regulation moderated the relation between grief variables and cannabis-related outcomes. I conducted two-

way and three-way interaction models using traditional Poisson regression and the “modglm” package (McCabe et al., 2024), allowing for conditional process decomposition and visualization of non-linear interaction effects. Poisson count regression was selected as the analytic approach because both outcome variables—30-day cannabis use frequency and CUD symptoms—were count-based, non-normally distributed, and inherently discrete. As Simmons et al. (2020) and Mize (2019) argue, when outcomes reflect actual counts of behaviors rather than continuous constructs, count-based regression models provide more valid inference and avoid the pitfalls of assuming normally distributed residuals. Although negative binomial regression can better account for overdispersion, and Quasi-Poisson better addresses inflated type I error, those models were not compatible with the modglm package, which was essential to testing moderation hypotheses and visualizing effects. The Poisson model enabled estimation of conditional marginal effects at high, average, and low levels of the moderator (emotion regulation difficulty), which is necessary given the non-linear nature of interaction slopes in count models (Mize, 2019; McCabe, 2022).

To improve interpretability and reproducibility, interaction terms were visualized using marginal effects plots, which included predicted IRR values and 95% confidence intervals. Following the interpretive steps outlined in Mize (2019), I: (1) estimated average marginal effects at multiple levels of the moderator, (2) plotted predicted values across the observed range of the predictor, and (3) evaluated the proportion of observation-wise interactions that reached statistical significance (rather than relying on the product term coefficient alone). These visualizations offered a clearer understanding of where and for whom grief variables predicted cannabis-related outcomes under conditions of low, average, or high emotion dysregulation. Due to technical limitations of the plotting package, marginal effects were visualized using Poisson

regression. However, primary inference and model selection were based on quasi-Poisson regression, which was shown to be more robust under overdispersion and non-Poisson distributions (Baggio et al., 2018). Interpretation of visual effects should therefore be made with caution and in the context of the more appropriate QP model.

Across all analyses, I used an alpha level of 0.05 and examined missing data patterns prior to model fitting. Although mediation models were originally planned to explore coping motives as a mechanism linking grief and cannabis use, I prioritized moderation models, as temporal precedence could not be established for the cross-sectional data used in the present study (Winer et al., 2016).

*Post hoc analyses.* I used G\*Power (Version 3.1.9.7) to conduct a post hoc sensitivity analysis, which indicated that the available sample size provided sufficient power ( $> .80$ ) to detect small-to-moderate effect sizes ( $f^2 \approx .02$ ) in multiple regression models. For Poisson regression models with interaction terms, I used simulation-based approaches in R (e.g., *simr*; Green & MacLeod, 2016) to confirm adequate power for detecting significant interaction effects.

*Missing data.* Before running primary analyses, I evaluated the missingness mechanism across the main study variables using the *MissMech* package in R (Jamshidian et al., 2014). A multivariate test for Missing Completely At Random (MCAR) using Hawkins' test and a non-parametric alternative both yielded statistically significant results ( $p < 0.001$ ), suggesting that data were not MCAR and were instead likely Missing at Random (MAR; Van Buuren, 2018). Given the presence of missing data not consistent with a Missing Completely At Random (MCAR) pattern, I proceeded using listwise deletion (complete-case analysis) for model estimation. Although this approach can lead to biased estimates under Missing At Random (MAR) or Missing Not At Random (MNAR) conditions (Van Buuren, 2018), it was selected as a

pragmatic solution due to the complexity of modeling interactions in count data, the incompatibility of imputation procedures with marginal effects visualization tools, and the need to retain compatibility with the `modglm` package. This decision reflects a common analytic trade-off in applied moderation research using Poisson-based count models (Baggio et al., 2018; McCabe et al., 2024), and model-based robustness techniques were used to mitigate associated bias. I examined the interaction effects between grief-related variables and emotion dysregulation on cannabis use outcomes using Poisson regression models. For each outcome—past 30-day cannabis use and cannabis use disorder (CUD) symptoms—I tested interactions between grief rumination or prolonged grief symptoms and emotion dysregulation. Significant interaction terms were probed using the `modglm` and `margplot` packages to explore conditional predicted values (McCabe et al., 2024).

## RESULTS

### Descriptive Statistics

I analyzed the data using R (R Core Team, 2024). My sample included 923 participants aged 17 to 56 years ( $M = 19.27$ ), with most participants (75%) between ages 18 and 20. As shown in Table 1, the racial composition was predominantly White (90.74%). Smaller percentages identified as Asian (1.50%), Black or African American (2.08%), American Indian or Alaska Native (0.35%), Native Hawaiian or Other Pacific Islander (0.58%), or another racial identity (2.66%). An additional 2.08% selected “Do Not Wish to Respond.” Regarding ethnicity, 17.25% identified as Hispanic or Latin/a/o/x/e, 70.41% as not Hispanic or Latin/a/o/x/e, 8.95% selected “Another,” and 3.38% did not wish to respond.

Most participants reported their assigned sex as female (69.48%) or male (30.20%), and 0.33% chose not to respond. When asked about gender identity, 67.04% identified as women, and 29.43% identified as men. The remaining 3.53% reported a range of gender-expansive identities, including genderqueer (0.61%), gender fluid (0.73%), non-binary (0.73%), agender (0.37%), demi girl (0.12%), trans man (0.24%), and other (0.12%). These findings reflect a primarily young, racially homogeneous sample with some diversity in ethnicity and gender identity, which is consistent with the sample demographic being undergraduate students in Colorado.

I summarized descriptive statistics for the main study variables in Table 2. On average, participants reported moderate levels of prolonged grief symptoms ( $M = 21.58$ ,  $SD = 9.18$ ), grief-related rumination ( $M = 28.87$ ,  $SD = 13.39$ ), and emotion dysregulation ( $M = 42.80$ ,  $SD = 12.64$ ). Cannabis-related variables were more varied and positively skewed, including hazardous

cannabis use ( $M = 6.28$ ,  $SD = 5.90$ ), past 30-day cannabis use ( $M = 9.44$ ,  $SD = 10.28$ ), and cannabis coping motivation ( $M = 7.63$ ,  $SD = 4.27$ ). The distribution of emotion dysregulation was approximately normal ( $skewness = 0.54$ ), but cannabis use measures and grief variables were non-normally distributed. Because of these distributional properties, I used Spearman correlations to examine bivariate associations (Baggio et al., 2018; Mize, 2019).

I found that prolonged grief symptoms were strongly correlated with grief rumination ( $\rho = 0.71$ ) and moderately associated with emotion dysregulation ( $\rho = 0.37$ ) and cannabis coping motivation ( $\rho = 0.12$ ). These results suggest that grief-related distress is tied to cognitive and emotional regulation processes. Hazardous cannabis use was strongly associated with both past 30-day use ( $\rho = 0.74$ ) and cannabis coping motivation ( $\rho = 0.59$ ) and showed smaller correlations with emotion dysregulation ( $\rho = 0.12$ ) and grief rumination ( $\rho = 0.09$ ). Importantly, prolonged grief symptoms were not significantly associated with hazardous cannabis use ( $\rho = 0.00$ ) or past-month use ( $\rho = -0.03$ ). These findings suggest that although cannabis use was linked to motivations to use cannabis as a coping mechanism, emotion regulation, and grief-related cognitive distress, it was not directly related to the severity of grief symptoms.

### **Poisson Regressions**

Neither grief rumination nor prolonged grief symptoms significantly predicted past-month cannabis use frequency, suggesting that grief-related cognitive and emotional distress do not necessarily increase how often cannabis is used. However, both grief rumination and prolonged grief symptoms were significant positive predictors of CUD symptoms. Grief rumination significantly predicted greater cannabis use disorder symptoms ( $b = 0.005$ ,  $SE = 0.001$ ,  $z = 5.47$ ,  $p < 0.001$ ). Similarly, prolonged grief symptoms were also a significant predictor of CUD symptoms ( $b = 0.006$ ,  $SE = 0.002$ ,  $z = 2.55$ ,  $p = 0.011$ ). These results suggest that higher

levels of prolonged grief and grief rumination are independently associated with more problematic cannabis use. Although incident rate ratios were modest, the significance of both models supports a small but meaningful association, reflecting the likely complexity and potentially indirect nature of the grief-to-cannabis-use pathway. These results are consistent with a broader literature suggesting that grief may not universally prompt increased substance use—but for some, particularly those with maladaptive coping tendencies, it contributes to more harmful use patterns (Hussong et al., 2017).

### **Quasi-Poisson Regressions**

To comprehensively address Aim 2 and mitigate the risk of inflated type I error associated with traditional Poisson regression models, I estimated quasi-Poisson models for direct effects of each grief variable predicting cannabis use outcomes. Consistent with the Poisson model, results indicated that grief rumination significantly predicted cannabis use disorder (CUD) symptoms, ( $b = 0.0054$ ,  $SE = 0.0023$ ,  $t = 2.32$ ,  $p = .021$ ,  $95\% CI [0.00089, 0.0099]$ ). This suggests that higher levels of grief rumination may be associated with modestly elevated rates of problematic cannabis use, even after adjusting for overdispersion. Additionally, and similar to the above findings using Poisson regression, neither grief rumination or PG symptoms significantly predicted 30-day cannabis use frequency.

However, the significant association between prolonged grief symptoms and CUD symptoms observed in the Poisson model ( $b = 0.006$ ,  $p = .011$ ) was no longer significant in the quasi-Poisson model ( $b = 0.0062$ ,  $p = .251$ ,  $95\% CI [-0.00438, 0.01678]$ ). This discrepancy likely reflects the sensitivity of standard Poisson models to overdispersion—a common feature in behavioral and substance use data. As Mize (2019) recommends, researchers should apply robust methods such as quasi-Poisson regression to reduce the risk of spurious findings caused by

underestimating standard errors. In this context, the loss of significance for prolonged grief symptoms under a more appropriate modeling approach suggests the original Poisson model may have overestimated the precision of the effect.

### **Interaction Models**

In my first interaction model, grief rumination significantly interacted with emotion dysregulation to predict past 30-day cannabis use ( $b = 0.0002$ ,  $IRR = 1.00020$ ,  $p = 0.0015$ ), indicating that for each one-unit increase in both variables, the expected rate of cannabis use frequency increased by approximately 0.02%. Follow-up analyses confirmed this interaction was significant across the full range of observations, with 100% of observation-wise estimates statistically significant. The average marginal interaction effect was positive ( $b = 0.0018$ ,  $SE = 0.0006$ ,  $t = 3.20$ ,  $p = 0.0014$ ), suggesting that grief rumination is more strongly associated with cannabis use frequency among those with higher emotion dysregulation. This pattern was visualized using a marginal effects plot (see Figure 1), which indicated that at high levels of dysregulation, increases in grief rumination were associated with steeper increases in predicted 30-day cannabis use compared to those with average or low dysregulation.

For the model predicting CUD symptoms, the interaction between grief rumination and emotion dysregulation approached significance in the base Poisson model ( $b = 0.0008$ ,  $IRR = 1.00011$ ,  $p = 0.10$ ). The average interaction effect was significant at the conventional alpha level ( $b = 0.0008$ ,  $SE = 0.0004$ ,  $t = 2.05$ ,  $p = 0.040$ ). Marginal effects plots again showed a strong positive relation between grief rumination and CUD symptoms occurred among those with high emotion dysregulation. However, only 85% of the observation-wise interaction effects were statistically significant. This proportion indicates that while the average interaction effect reached statistical significance, the moderation was not uniformly robust across the sample—

suggesting that the grief–CUD association is conditionally moderated by emotion dysregulation for most, but not all, individuals.

I also tested moderation models using prolonged grief symptoms as the predictor. The interaction between prolonged grief symptoms and emotion dysregulation was significant for both 30-day use frequency and hazardous cannabis use. For 30-day use, the interaction term was  $IRR = 1.00064$  ( $b = 0.0006$ ,  $p < 0.001$ ), suggesting a 0.064% increase in expected use frequency for each one-unit increase in both PG and emotion dysregulation. Marginal effects plots further indicated a significant interaction ( $b = 0.004$ ,  $SE = 0.001$ ,  $t = 3.88$ ,  $p = 0.0001$ ), with 100% of individual-level effects reaching significance (see Figure 2). A similar pattern was observed for CUD symptoms such that for each unit increase in both PG and emotion dysregulation, there is a 0.089% increase in expected CUD symptoms for. ( $b = 0.0009$ ,  $IRR = 1.00089$ ,  $p < 0.001$ ). The model predicting CUD symptoms also yielded a significant marginal effect ( $b = 0.0053$ ,  $SE = 0.00097$ ,  $t = 5.44$ ,  $p < 0.001$ ) and was robust across the sample (see Figure 3). Visualizations again demonstrated steeper slopes linking prolonged grief to cannabis outcomes among those with higher dysregulation.

### **Post Hoc Analyses**

I tested overdispersion in each model by dividing the sum of squared Pearson residuals by the residual degrees of freedom. All four Poisson models exhibited substantial overdispersion (ratios ranging from 4.82 to 12.53, all  $p < 0.001$ ), indicating that the Poisson assumption of dispersion was violated. This suggests that standard errors may be underestimated and significant values potentially inflated. As such, Poisson regression results may be interpreted with caution.

In addition to significance testing and marginal effects plots, I evaluated model fit using Akaike's Information Criterion (AIC), where lower values indicate better relative fit while

accounting for model complexity. The model predicting 30-day cannabis use from grief rumination and emotion dysregulation yielded an AIC of 9703.1, suggesting a modest fit given the sample size and predictors. The corresponding model predicting CUD symptoms had a lower AIC of 6744.6, indicating better relative fit, possibly reflecting tighter dispersion around the predicted counts of problematic use.

Model fit improved notably when prolonged grief symptoms were used as the primary predictor. The model predicting 30-day cannabis use had an AIC of 4227.5. In contrast, the model predicting CUD symptoms had the lowest AIC of all ( $AIC = 2351.6$ ), reflecting the most efficient balance of model complexity and fit to the data. These AIC differences suggest that the newly developed and validated measure for prolonged grief symptoms may be a stronger or more direct predictor of cannabis-related outcomes than grief rumination, at least within the structure of the current models.

I also reported incidence rate ratios (IRRs) and their 95% confidence intervals for interpretability (see tables 3-5). For example, in the model predicting 30-day use, each one-point increase in grief rumination was associated with a 0.9% decrease in use frequency ( $IRR = 0.99$ , 95% CI [0.98, 0.99]), while the significant interaction term ( $IRR = 1.0002$ , 95% CI [1.0001, 1.0003]) suggested a multiplicative increase in risk depending on emotion dysregulation levels.

Finally, I conducted post hoc power analyses using Monte Carlo simulations via the `simr` package (Green & MacLeod, 2016) to estimate power for key interaction and main effects. Despite medium-to-large observed effect sizes in some models, all Poisson regression models returned power estimates of 0% with wide confidence intervals (95% CI: 0.00–3.62). This result likely reflects the “observed power” nature of the test and persistent convergence errors in the random effects models, indicating that these analyses are underpowered and should be

interpreted with caution. Future studies should include larger, balanced samples to support more robust and interpretable power estimation.

Collectively, these findings provide evidence that difficulties in emotion regulation moderate the relationship between grief and cannabis use. The interaction patterns suggest that grief—whether expressed as symptoms or ruminative thoughts—is more closely tied to elevated hazardous cannabis use when individuals also struggle with regulating their emotional experiences.

## DISCUSSION

### Summary of Findings

Results of the study indicated that while grief symptoms and grief rumination were not directly associated with cannabis use frequency, and rumination was modestly predictive of increased CUD symptoms, emotion regulation difficulties significantly moderated these relations, such that problematic cannabis use was highest among individuals high in both grief and emotion dysregulation. Although symptoms of prolonged grief alone may not universally predict problematic cannabis use, a positive predictive relation between grief and problematic cannabis use emerged for those who also demonstrated reduced emotion regulation capacity. The study findings support and extend theoretical models (e.g., Gross's Process Model, DPM) which posit that maladaptive coping processes intensify when internal regulation fails and similarly highlights conditional risk pathways for bereaved emerging adults, specifically in terms of elevated risk for cannabis misuse. While prolonged grief interventions have historically focused on grief alone as a presenting concern, findings are suggestive that intervention and screening efforts may benefit from contextualizing an individual's response to grief events in terms of emotion regulation capacity.

My primary hypothesis that individuals with greater prolonged grief symptoms will also endorse increased cannabis use frequency and CUD symptoms, was not supported. However, as suspected, higher prolonged grief symptoms were strongly linked with elevated grief rumination and moderately correlated with increased emotion dysregulation. Interestingly, while PG symptoms did not significantly relate to cannabis use patterns, higher PG symptoms significantly related to elevated cannabis coping motives. This suggests that, while PG might not change an

individual's behavioral cannabis use patterns, it may be the case that grieving individuals may shift their motivations for use to align with coping needs.

Most notably in terms of grief rumination were the significant findings that grief rumination modestly correlated with increased cannabis use disorder symptoms, paired with the lack of relation to 30-day cannabis use frequency. This seemingly contradictory finding may be partially explained by the field's current conceptualization of cannabis use disorder as a multifaceted measure that includes frequency as one important domain among many (e.g., impairment, potency). Meaning that, by comparison, past 30-day use frequency is a measure much narrower in scope and does not account for associated problems of use. For example, it may be the case that an individual uses cannabis every day for medical purposes (i.e., as prescribed by their doctor), and may not indicate elevated CUD scores due to lack of impairing characteristics. Taken together, this pattern of findings may suggest that, while grief rumination is not linked to greater frequency of use, there is a significant positive relation between grief rumination and increased problematic cannabis use.

The findings that rumination was related to CUD symptoms, while prolonged grief symptoms were not, also provides an interesting distinction. This pattern may be somewhat indicative of prior findings on grief rumination as a perpetuating factor of PGD (Eisma et al., 2015; Boelen et al., 2006). Further, and similar to the distinction between frequency and CUD, grief rumination as a construct is much broader in measuring a range of severity in cognitions, whereas the formulation of the newly-validated PG-13-R was made for diagnostic functionality and may fail to capture those with more nuanced subthreshold symptoms.

Findings from my initial study aim suggest that the relation between grief and cannabis use may be conditional by establishing support for a complicated constellation of grief,

rumination, emotion, and substance use behaviors, necessitating subsequent regression and interaction analyses.

Addressing my second aim revealed that neither PG symptoms nor grief rumination meaningfully predicted cannabis use frequency at the bivariate level in Poisson models. However, a modest predictive relation, where elevated grief rumination or prolonged grief symptoms predicted greater CUD symptoms was supported. Notably, the significant relation between grief rumination and CUD symptoms remained consistent under Quasi-Poisson regression analyses where type I error was accounted for. However, the Quasi-Poisson model examining the direct effects of prolonged grief on CUD symptoms demonstrated non-significance. Together, these findings reinforce the importance of selecting regression models that appropriately account for the distributional characteristics of count data. Quasi-Poisson regression—by adjusting the dispersion parameter—provided a more conservative and reliable estimate of the true association in addressing aim 2 of the present study. This approach improves inference accuracy and reduces the likelihood of type I error, especially when investigating subtle psychological predictors of substance use outcomes in observational data.

My hypotheses that grief and rumination may predict cannabis use frequency were not supported at the direct effects level, suggesting that grief itself is not a strong standalone risk factor—but that other internal vulnerabilities shape behavioral outcomes. Although direct effects of rumination were observed on CUD symptom scores, these effects were negligible in size and demonstrated poor model fit—and as such, should be interpreted with caution. Further, when considering the shared links between grief and cannabis use (e.g., emotion dysregulation, cannabis coping motivation), conditional factors may be required to meaningfully activate the risk pathway. This deduction is consistent with Eisma et al. (2013) findings that grief rumination

is associated with emotional avoidance and suggests the behavioral expression of that avoidance (i.e., cannabis use) may depend on conditional factors like emotion regulation. The observed limitations of assuming a direct grief-to-use pathway in the present study indicates the need for more complex study designs (e.g., longitudinal, EMA) and models (e.g., moderation, mediation) to understand the conditions under which grief increases substance use risk. In addition, while these findings were partially consistent with Masferrer et al. (2017b) who found elevated rates of SUD in a clinical sample with complicated grief—it is possible that the present study’s non-clinical college sample may not experience PGD symptoms intensely enough to drive behavior on their own—necessitating increased use of clinical samples in future studies.

Finally, my hypothesis that emotion dysregulation would moderate the effects of grief and rumination on cannabis outcomes was supported. Significant interactions emerged between both prolonged grief and rumination with emotion dysregulation to predict (1) past 30-day cannabis use and (2) cannabis use disorder (CUD) symptoms. Meaning, grief may not be meaningfully predictive of problematic cannabis use patterns in a vacuum, but this relation becomes behaviorally impactful when the individual lacks more adaptive tools to regulate emotional distress. As cannabis use has been established as a maladaptive external regulation strategy, it becomes reasonable to suspect that those who have used cannabis previously, and have a reduced capacity to regulate emotions, may be more likely to use cannabis more frequently, and more problematically. Support for the significant interaction between grief and emotion regulation difficulties in predicting increased cannabis use is strongly consistent with findings from Hussong et al. (2011): Emotion dysregulation moderates the stress-substance use link. However, the findings in the present study serve to add complexity to prior studies by disentangling and thereby specifying more robust predictors within Hussong et al.’s existing

model of general stress. Further, findings are supportive of Boelen’s cognitive-behavioral model of prolonged grief (2006) in that avoidance (e.g., cannabis use) likely provides relief from acute grief symptoms by blocking emotional processing. This prior work helps to further contextualize the present study models by explaining the process by which someone struggling with elevated grief, who has limited adaptive and emotional and coping resources, may seek to ameliorate distress through external sources in efforts to block emotional processing.

Within this context, it appears that emotion regulation difficulties may partially explain who is at risk for grief-related cannabis misuse. Practically, these findings provide new directions for intervention strategy research and suggest the utility of targeting emotion regulation skills in bereaved emerging adults who are at risk for poorer behavioral outcomes. Further, the present study supports developing integrated approaches for populations where grief and cannabis use intersect—especially for those with poorer emotion regulation. As the positive associations between grief and cannabis misuse either diminished or reversed for those who demonstrated greater capacity for emotion regulation, this poses subsequent questions about its therapeutic utility within relevant populations. It may be the case that those who presently demonstrate a positive grief-cannabis use relation would see reductions in the strength and/or direction of this association when receiving targeted emotion regulation interventions, as opposed to treatment as usual.

### **Limitations**

Several limitations should be considered when interpreting these findings. First, results from overdispersion checks indicated that the variance in the data exceeded what the Poisson distribution assumes. Overdispersion ratios ranged from 4.8 to 12.5 across models, and Pearson chi-square tests were all significant. While a Negative Binomial model may have provided a

better statistical fit, I retained the Poisson approach for a few reasons. Most importantly, Poisson regression allowed for the use of the `modglm` and `margplot` packages to test and visualize interaction effects across the full distribution of the outcome—tools that were central to my hypotheses. I directly evaluated and reported the overdispersion issue and interpreted the results cautiously.

Second, although zero-inflated models could have been used, given the large proportion of participants reporting no cannabis use or few CUD symptoms, my primary interest was not predicting zero vs. non-zero values. Instead, I was focused on the way that grief-related variables interacted with emotion dysregulation to explain variability in cannabis use outcomes across the full range of responses. As such, Poisson and Quasi-Poisson regressions aligned best with the analytic goals and theory underlying the study.

I also acknowledge that I tested multiple interaction models without a formal correction for multiple comparisons. That said, all models were theory-driven and selected in advance to address specific hypotheses. I prioritized interpreting effects that showed strong statistical support (e.g., proportion of significant interaction terms, consistent patterns in observation-wise estimates, and differentiated marginal effect plots) and interpreted marginal findings more cautiously.

Post hoc power analyses using Monte Carlo simulations via the `Simr` package returned very low estimates of observed power for key interaction effects despite medium-to-large effect sizes. These results should be interpreted carefully, as the power estimates likely reflect convergence issues in mixed-effects models and sample size limitations due to missing data. While several interaction effects were statistically significant and supported by multiple

diagnostics, future studies would benefit from larger and more balanced samples to increase statistical power and precision.

In terms of missing data, I evaluated the missing data mechanism using the MissMech package (Jamshidian et al., 2014). Results supported the assumption that data were missing completely at random (MCAR), but missingness still reduced sample sizes in key models. Given that outcomes were non-normally distributed and the imputation of interaction terms can introduce bias, I chose listwise deletion and reported the number of cases dropped in each model.

In terms of methodological limitations, several should be noted. First, the cross-sectional nature of the data limits the ability to set temporal precedence and draw conclusions about the directionality of observed effects. Although the moderation patterns support the theoretical proposition that emotion dysregulation amplifies grief-related cannabis risk, it remains possible that problematic cannabis use or poor regulation capacity could alternatively influence grief symptom expression, particularly in cases of prolonged grief. Longitudinal designs are needed to clarify these temporal and reciprocal processes in future efforts to understand the grief-cannabis use pathway. Second, the sample primarily consisted of college-aged, white participants from a single U.S. university, which limits generalizability to more diverse populations, clinical populations, or non-student emerging adults. Third, while coping motives for cannabis use were assessed, these variables were not tested as mediators, despite their conceptual relevance, due to the lack of temporal precedence established in the present study. Including cannabis coping motives as a mediator could clarify the mechanisms linking grief, dysregulation, and cannabis outcomes. Finally, although time since loss was collected, it was not included as a predictor or moderator. Cannabis use behavior, as has been established for grief symptoms, likely varies based on proximity to the loss event, and future models would benefit from exploring how

temporal distance from bereavement may interact with emotional vulnerabilities to influence substance use risk. Taken together, these limitations suggest that future research must prioritize EMA/longitudinal, multivariate models in diverse samples to identify dynamic, person-specific risk processes and intervention targets.

### **Strengths**

This study offers several strengths that enhance both its method and relevance to public health. Most notably, it is the first known study to empirically test interactions between grief-related symptoms and emotion dysregulation in predicting cannabis use patterns among emerging adults. This novel focus advances our understanding of how psychological vulnerabilities intersect to differentially effect substance use risk following bereavement—offering a clearer profile of high-risk individuals in an under-researched area.

In terms of methods, the study utilized a large sample of bereaved cannabis users (N = 923), which enabled the detection of meaningful interaction effects and allowed for the application of more complex multivariate models. The inclusion of validated measures for each construct further strengthens the internal validity of the findings. Moreover, the analytic strategy incorporated full moderation modeling with advanced marginal effects visualization, which provided a nuanced interpretation of the conditional effects—helping to gain insights that are both statistically robust and clinically interpretable.

The study also holds timely cultural and developmental relevance in that cannabis use continues to rise among emerging adults, who remain the most frequent consumers of cannabis products in the U.S. Simultaneously, rates of PGD are elevated in this age group, especially in the wake of recent collective losses due to the COVID-19 pandemic, social unrest, and community violence. Within this larger context, the present study responds to an urgent public

health need to understand how normative and pathological grief may intersect with substance use behaviors in a developmentally vulnerable group—especially as cannabis becomes increasingly normalized.

## **Contributions**

*Theoretical significance.* The findings of this study meaningfully advance grief and substance use literature by integrating two historically parallel domains—grief theory and addiction research—into a unified framework centering risk. Notably, results lend empirical support to the self-medication hypothesis by suggesting that cannabis use may function as an external regulatory tool, but only for grieving individuals with reduced internal emotion regulation capacity. Cannabis use appears not to be a direct response to grief alone, but rather, a conditional and compensatory behavior triggered by inadequate emotional processing resources.

These findings align with Gross's (1998) process model of emotion regulation, which distinguishes maladaptive (e.g., suppression, avoidance) strategies from adaptive responses. The data reinforce that the presence of intense emotion—such as grief—does not predict poor substance use outcomes, but rather the regulation strategies employed in response. For those who lack adaptive means of modulating their grief-related distress, it may be more likely these individuals turn to avoidant behaviors such as cannabis use to downregulate emotions.

Similarly, the results are consistent with the Dual Process Model (Stroebe & Schut, 1999), which frames grief adaptation as requiring oscillation between emotional confrontation and restoration-oriented coping. Emotionally dysregulated individuals may become "stuck" in loss-oriented processing or fail to move into adaptive re-engagement with life, instead relying on cannabis to "blunt" emotional intensity, so to speak. The interaction findings support this model by showing that those high in both grief and dysregulation consistently display the steepest

trajectories of cannabis misuse, implying that impaired emotional flexibility may drive avoidant substance use.

Importantly, the data also clarify grief rumination's role as a conditional risk factor. Although rumination did not robustly predict use on its own, its interaction with dysregulation significantly forecasted problematic cannabis patterns. This suggests that rumination, in isolation, may not be intrinsically maladaptive—but becomes a vulnerability when paired with limited regulation capacity. In doing so, the study refines previous models of PGD maintenance by demonstrating that cognitive and emotional factors merge to shape behavioral outcomes such as substance use.

*Public health implications.* Results provide new considerations for screening individuals in clinical settings to include both grief symptoms and emotion dysregulation in assessments of cannabis-using young adults, as those with the highest risk potentials may be missed in current care setting. As previously stated, findings of the significant interaction effects between grief and emotion regulation which impact cannabis use may be considered in the development or adaptation of grief-informed interventions that incorporate emotion regulation training (e.g., DBT, ACT) for emerging adults. Further, conclusions drawn from the present study may be important more systemically in considering resources for campus settings or youth health centers where cannabis use is common, as elevated supports for grief and substance use interventions may provide more adequate support in the specified population. Lastly, overall study findings may better serve educators and clinical professionals in informing how emotion dysregulation moderates bereavement risk and potential substance misuse trajectories.

## **Future Directions**

Several future directions are warranted to expand, refine, and translate the current findings. First, longitudinal studies are critical to establish the temporal order of effects and to clarify whether grief precedes cannabis misuse, and/or whether ongoing substance use may impair grief resolution. Clarifying the directionality of the relation is particularly important given the theoretical and clinical implications for identifying risk windows via processes like chain analysis and timing interventions.

Second, and concurrent with the need for longitudinal studies, mediation analyses should be prioritized in future models—especially testing whether coping motives mediate the relationship between grief and cannabis use outcomes. Although the present study assessed coping motives, temporal limitations precluded formal mediation testing (Hayes, 2009; Winer et al., 2016). Incorporating coping motives may provide clarity on why individuals high in grief and dysregulation turn to cannabis, and whether such use functions to ameliorate, avoid, or manage distress.

Third, future research should explore subtypes of loss experiences, including sudden versus expected deaths, or deaths involving close relationships (e.g., sibling, parent, partner). These characteristics may moderate the intensity and duration of grief, thereby impacting substance use patterns and coping needs. Fourth, the inclusion of racially, ethnically, and culturally diverse samples is essential for meaningful generalizability to the general public. Grief experiences—and their intersections with emotion and substance use—are likely shaped by cultural/social expectations and community-level resources, which the current sample was not suited to address. In addition, future work should examine the role of family-level factors, such as emotional socialization practices, attachment styles, and modeled coping behaviors. For

example, families that openly acknowledge and support emotional expression may buffer against maladaptive coping strategies, including substance use. Understanding these dynamics may offer important avenues for grief-informed prevention efforts, particularly those focused on enhancing emotion regulation and healthy coping within the family system.

Although grief and rumination were not meaningful predictors of cannabis use outcomes alone, this relation was most behaviorally consequential in those with reduced emotion regulation skills. This finding suggests that grief-related cannabis use may be best understood through an interactional lens, where the interplay of emotion, cognition, and coping capacity may change the level of associated substance use risks. Supporting emotion regulation may be critical in helping emerging adults navigate grief without turning to maladaptive means of coping, such as in problematic substance use. Ultimately, this research suggests the potential utility of more personalized approaches to substance use prevention and treatment in those that present with more dynamic emotional vulnerability profiles—such as in those with reduced emotion regulation skills experiencing grief— as risk may change substantially depending on an individual’s grief-emotion profile.

Finally, the present findings invite more nuanced future considerations of whether cannabis use in the context of grief is inherently maladaptive. While the data point to elevated risk for problematic use among those with emotion dysregulation, it is possible that some individuals may derive short-term relief or psychological benefits from acute cannabis use during bereavement—such as reduced emotional arousal or enhanced present-moment awareness. This raises important questions about differential risk versus resilience pathways. Future research should aim to disentangle for whom, and under what circumstances, cannabis use may serve as a temporary regulatory aid versus a trajectory toward dependency. Ideal next steps may involve

mixed-method or longitudinal EMA (ecological momentary assessment) designs that capture temporal associations between cannabis use episodes and momentary affect regulation during the grieving process. Such studies could better determine whether acute use facilitates adaptive emotional processing or delays long-term adjustment. These designs, especially when applied across diverse populations and varying loss contexts, would offer critical insight into whether—and when—cannabis use is a coping behavior that should be redirected or supported.

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**Table 1**  
*Participant Demographics.*

Demographic	Category	<i>n</i>	%
Age	M = 19.27, Range = 17–56	923	
Race	White	838	90.74
	Black or African American	19	2.08
	Asian	14	1.50
	American Indian or Alaska Native	3	0.35
	Native Hawaiian or Pacific Islander	5	0.58
	Another	25	2.66
	Do Not Wish to Respond	19	2.08
Ethnicity	Hispanic or Latin/a/o/x/e	159	17.25
	Not Hispanic or Latin/a/o/x/e	650	70.41
	Another	83	8.95
	Do Not Wish to Respond	31	3.38
Sex (Assigned at Birth)	Female	641	69.47
	Male	279	30.20
	Do Not Wish to Respond	3	0.33
Gender Identity	Woman (including cisgender)	619	67.03
	Man (including cisgender)	272	29.42
	Genderqueer	6	0.61
	Gender fluid / Fluid	7	0.73
	Gender non-binary / Non-Binary	7	0.73
	Agender	3	0.37
	Demigirl	1	0.12
	Trans man / Trans Man	2	0.24
	Other	1	0.12
	Choose not to respond / DNWTR	3	0.37

*Note.* Percentages may not sum to 100.00 due to rounding and/or selecting multiple response options (i.e., endorsing more than one gender).

**Table 2**

*Descriptive Statistics and Spearman Correlations of Grief, Cannabis, Emotion Regulation, and Coping.*

	M	SD	1	2	3	4	5
1. Prolonged Grief Symptoms	21.58	9.18	—				
2. Grief Rumination	28.87	13.39	0.71***	—			
3. Hazardous Cannabis Use	6.28	5.90	0.00	0.09**	—		
4. Past 30-Day Cannabis Use	9.44	10.28	-0.03	-0.03	0.74***	—	
5. Emotion Dysregulation	42.80	12.64	0.37***	0.28***	0.12***	0.03	—
6. Cannabis Coping Motives	7.63	4.27	0.12*	0.17***	0.59***	0.49***	0.29***

*Note.* M = mean; SD = standard deviation. Values reflect Spearman's  $\rho$ . \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 3**

*Poisson regression examining the interaction between Grief Rumination and Difficulties with Emotion Regulation (DERS) predicting 30-day cannabis use frequency.*

Predictor	Estimate	IRR	95%CI	SE	z	p
Intercept	2.37	-	-	0.098	24.042	<0.001***
Grief Rumination	-0.0092	0.99	[-0.015, -0.0032]	0.0031	-2.94	0.003**
DERS total	-0.0025	0.99	[-0.0066, 0.0016]	0.0021	-1.18	0.24
GR × DERS	0.00019	1.00020	[0.00007, 0.00031]	0.000062	3.17	0.0015**

*Note.* DERS = Difficulties with Emotion Regulation, GR = Grief Rumination. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 4**

*Poisson regression examining the interaction between Prolonged Grief Symptoms and Difficulties with Emotion Regulation (DERS) predicting 30-day cannabis use frequency.*

Predictor	Estimate	IRR	95% CI	SE	z	p
Intercept	2.57	-	-	0.18	14.036	< 0.001***
Prolonged Grief	-0.021	0.98	[-0.0365, -0.0055]	0.0079	-2.66	0.0079**
DERS	-0.018	0.98	[-0.0262, -0.0098]	0.0042	-4.34	0.00001***
PG × DERS	0.00064	1.00064	[0.00033, 0.00095]	0.000160	3.99	0.00007***

*Note.* DERS = Difficulties with Emotion Regulation, PG = Prolonged Grief Symptoms. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 5**

*Poisson regression examining the interaction between Prolonged Grief Symptoms and Difficulties with Emotion Regulation (DERS) predicting Cannabis Use Disorder (CUD) symptoms.*

Predictor	Estimate	IRR	95% CI	SE	z	p
Intercept	2.56	-	-	0.19	12.87	< 0.001***
Prolonged Grief	-0.036	0.96	[-0.0530, -0.0189]	0.0087	-4.19	0.00003***
DERS	-0.019	0.98	[-0.0274, -0.0106]	0.0044	-4.26	0.00002***
PG × DERS	0.00089	1.00089	[0.00056, 0.00122]	0.00017	5.17	< 0.001***

*Note.* DERS = Difficulties with Emotion Regulation, PG = Prolonged Grief Symptoms. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 6**

*Conditional Interaction Summary of Tested Moderations.*

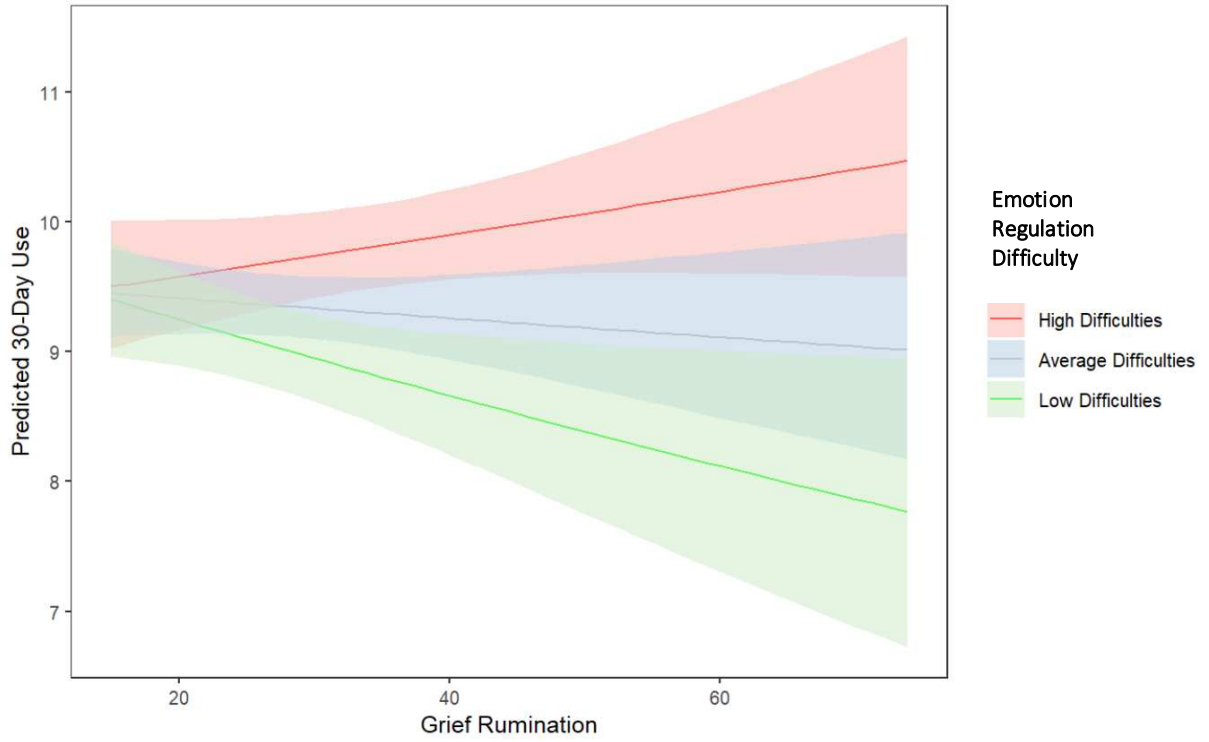
Interaction Term	Estimate	<i>IRR</i>	<i>95% CI</i>	<i>SE</i>	<i>t</i>	Marginal <i>p</i>	Prop .sig
PG × DERS (CUD)	0.0053	1.0053	[1.003, 1.007]	0.00097	5.44	<0.001***	1.00
PG × DERS (30-day)	0.0042	1.0042	[1.002, 1.006]	0.0011	3.88	0.00010***	1.00
GR × DERS (30-day)	0.0018	1.0018	[1.001, 1.003]	0.00056	3.20	0.0014**	1.00
GR × DERS (CUD)	0.00081	1.0008	[1.000, 1.002]	0.00039	2.05	0.0402*	0.85

*Note.* DERS = Difficulties with Emotion Regulation, PG = Prolonged Grief Symptoms, GR = Grief Rumination, CUD = Cannabis Use Disorder Symptoms, 30-Day= 30-day cannabis use frequency. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

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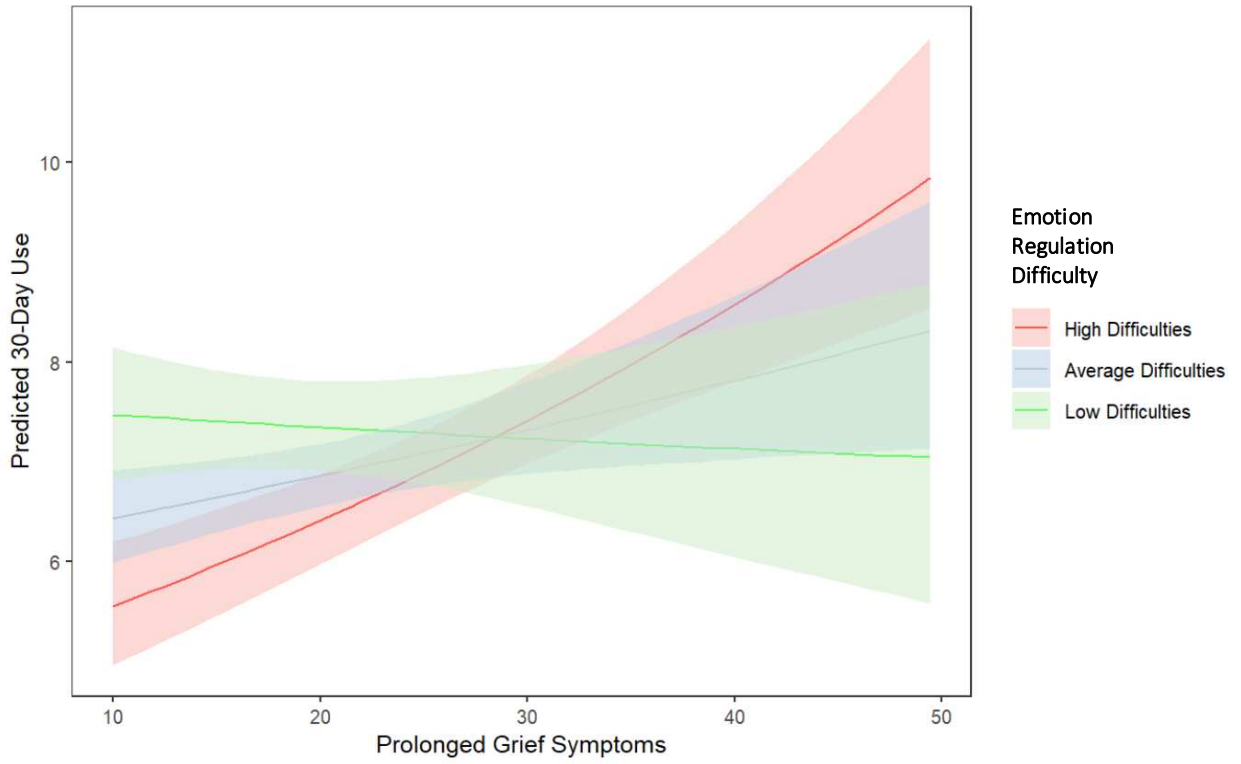
**Figure 1**

*Interaction between grief rumination and emotion regulation difficulty predicting 30-day cannabis use.*



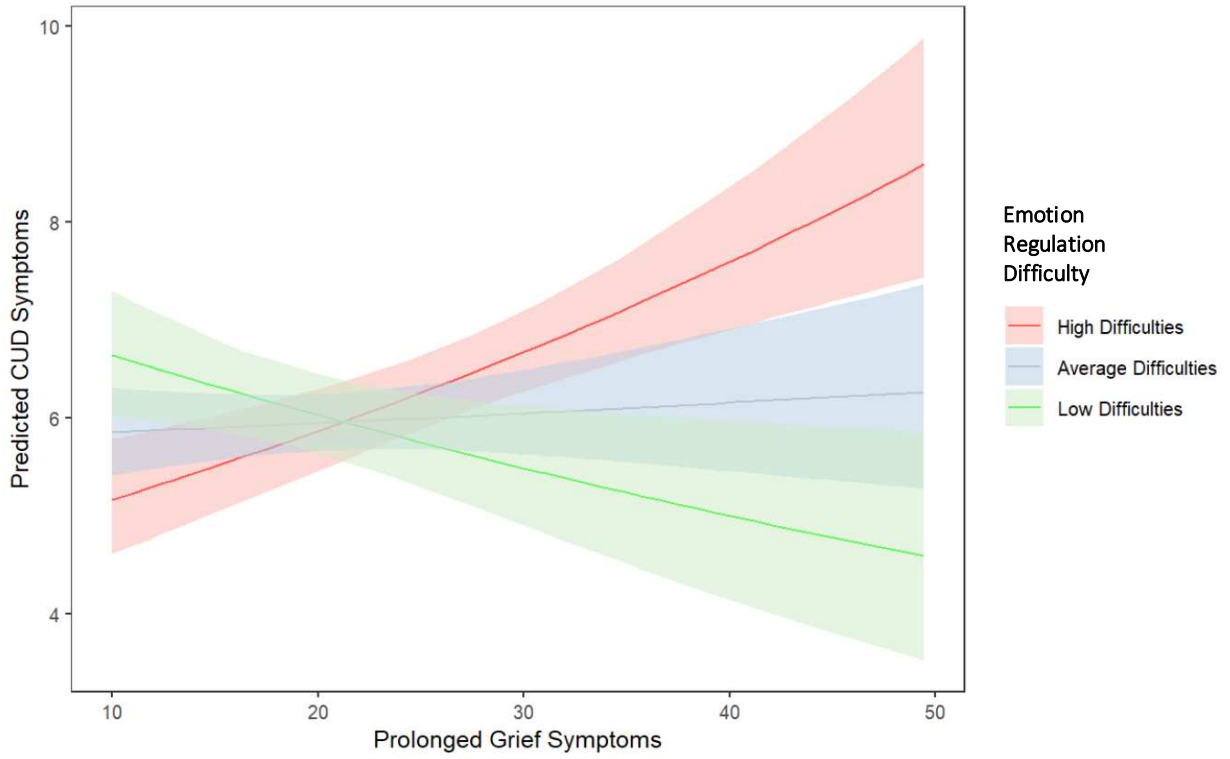
**Figure 2**

*Interaction between prolonged grief and emotion regulation difficulty predicting 30-day cannabis use.*



**Figure 3**

*Interaction between prolonged grief and emotion regulation difficulty predicting hazardous cannabis use.*



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