

TELEHEALTH-DELIVERED WRITTEN EXPOSURE THERAPY BY  
PARAPROFESSIONAL COACHES FOR TEENAGERS WITH POST-TRAUMATIC  
STRESS DISORDER: A FEASIBILITY TRIAL

by

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## ABSTRACT

**Background:** Teenagers with post-traumatic stress disorder (PTSD) face significant barriers to accessing evidence-based care, including provider shortages and limited developmentally appropriate interventions. Written Exposure Therapy (WET) is a brief, exposure-based treatment with demonstrated efficacy in adults. However, it has never been evaluated in teens using a telehealth format, nor delivered by paraprofessional providers.

**Objectives:** This study evaluated the feasibility and preliminary clinical outcomes of delivering WET to teenagers with PTSD symptoms via telehealth. Specifically, it assessed trial feasibility (e.g., recruitment, retention) and intervention feasibility (e.g., adherence, fidelity) when WET was delivered by trained paraprofessional coaches. Exploratory analyses examined preliminary effectiveness by testing pre-to-post-treatment changes in PTSD symptoms, depression, anxiety, and functional impairment, and session-by-session changes in subjective distress and substance craving.

**Methods:** This controlled case series analyzed six participants (aged 13-19) enrolled in a larger feasibility trial. Participants were randomized to immediate WET ( $n = 4$ ) or a 5-week waitlist control ( $n = 2$ ). WET was delivered remotely over five weekly sessions via secure video conferencing by trained paraprofessional coaches. Pre- and post-intervention assessments included standardized self-report measures of PTSD symptoms, depression, anxiety, and functional impairment. At each WET session, subjective distress and substance craving measures were taken before and after writing. Feasibility indicators included recruitment and enrollment rates, retention, session adherence, and protocol fidelity. Clinical outcomes were evaluated using reliable change indices, minimal clinically important differences, and shifts in diagnostic thresholds.

**Results:** Recruitment yielded an average of seven inquiries per month, with an eligibility rate of 43% and retention rate of 83%. All WET participants ( $n = 4$ ) completed all sessions; no treatment dropouts occurred. Coaches demonstrated high fidelity to the protocol. Among WET participants with post-intervention data ( $n = 3$ ), all showed clinically significant improvement in at least one symptom domain. In contrast, the two waitlist participants showed no clinically meaningful gains, and both demonstrated reliable symptom worsening on at least one outcome measure. No adverse events were reported.

**Conclusions:** This case series feasibility study offers preliminary support for telehealth-delivered WET in adolescents. Strong adherence, high retention, and early signs of clinical benefit support the acceptability of the protocol and the potential of task-shifting to trained paraprofessional providers. Future trials should evaluate clinical effectiveness in larger, more diverse samples and investigate whether and how structured caregiver involvement and real-world implementation strategies may optimize engagement and outcomes.

## LIST OF ABBREVIATIONS USED

APA	American Psychiatric Association
CBCT	Cognitive Behavioral Conjoint Therapy for PTSD
CBT	Cognitive Behavioral Therapy
CI	Confidence Interval
CPT	Cognitive Processing Therapy
CRAFT	Community Reinforcement and Family Training
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text-Revised
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
DSM-5-TR	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text-Revised
EMDR	Eye Movement Desensitization and Reprocessing
EPT	Emotional Processing Theory
GAD-7	Generalized Anxiety Disorder-7
HPA	Hypothalamic-Pituitary-Adrenal
ISTSS	International Society for Traumatic Stress Studies
LEC-5	Life Events Checklist for the DSM-5
MCID	Minimally Clinically Important Difference
m-WET	Modified Written Exposure Therapy
N	Number of participants
NET	Narrative Exposure Therapy
NICE	National Institute for Health and Care Excellence
PCL-5	PTSD Checklist for the DSM-5
PE	Prolonged Exposure
PHQ-9	Patient Health Questionnaire-9
PTSD	Post-Traumatic Stress Disorder
RCI	Reliable Change Index
RCT	Randomized Controlled Trial
REB	Research Ethics Board
REDCap	Research Electronic Data Capture
SD	Standard Deviation
SDS-A	Sheehan Disability Scale for Adolescents
STAIR	Skills Training in Affective and Interpersonal Regulation
TF-CBT	Trauma-Focused Cognitive Behavioral Therapy
WET	Written Exposure Therapy

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## CHAPTER 1 – INTRODUCTION

### 1.1 Adolescent Trauma and PTSD

The *Diagnostic and Statistical Manual of Mental Disorders 5th Edition* (DSM-5) (American Psychiatric Association [APA], 2013), and its *Text Revision* (DSM-5-TR) (APA, 2022) define trauma as exposure to actual or threatened death, serious injury, or sexual violence. This exposure may occur through direct experience, witnessing the event in person, or learning that it occurred to a close family member or friend. Such experiences qualify as a Criterion A trauma exposure, which is the necessary precipitating event for a diagnosis of post-traumatic stress disorder (PTSD).

One of the most severe outcomes following trauma exposure in teenagers is the development of PTSD. According to the DSM-5-TR, PTSD requires trauma exposure (Criterion A) and is defined by four clusters of symptoms: (1) intrusion symptoms, such as distressing memories, nightmares, and dissociative flashbacks (Cluster B); (2) avoidance of internal or external trauma-related cues (Cluster C); (3) persistent negative alterations in cognition and mood, including distorted beliefs, negative emotional states, and diminished interest in activities (Cluster D); and (4) marked alterations in arousal and reactivity, including hypervigilance, irritability, sleep disturbances, and impaired concentration (Cluster E) (American Psychiatric Association, 2022). For a formal diagnosis, these symptoms must persist for more than one month, cause significant distress or functional impairment, and be directly attributable to the trauma exposure.

#### 1.1.1 Epidemiology

Trauma exposure is highly prevalent during the teenage years. In a nationally representative U.S. sample of 6,483 teens aged 13 to 17, 61.8% reported experiencing at

least one potentially traumatic experience, and 18.6% reported exposure to three or more such experiences (McLaughlin et al., 2013). The most frequently endorsed traumas included the unexpected death of a loved one (28.2%), natural or man-made disasters (14.8%), and witnessing serious injury or death (11.7%). In Mexico, 68.9% of youth aged 12 to 17 reported trauma exposure, with bereavement, domestic violence, and accidents being most common (Orozco et al., 2008). By contrast, lower prevalence was reported in the U.K., where only 31.3% of participants in a birth cohort of 2,232 youth reported trauma exposure by age 18 (Lewis et al., 2019). Similarly, in Germany, just 21.4% of teenagers and young adults aged 14 to 24 reported exposure to a qualifying Criterion A event (Perkonig et al., 2000). These discrepancies likely reflect differences in measurement methods, exposure to violence, and the structure of health systems. For example, health systems vary in how routinely they screen for mental health concerns, document trauma exposure, and provide referrals or treatment (Barwick et al., 2004; Kutcher et al., 2010; Lee et al., 2021). These practices can influence whether individuals disclose traumatic experiences and whether such experiences are captured in population surveys.

Although not all trauma-exposed teenagers develop PTSD, a substantial proportion do. A meta-analysis of 72 studies found that 15.9% of trauma-exposed children and adolescents met criteria for PTSD (Alisic et al., 2014), though U.S. estimates suggest a lower rate of 7.6% (McLaughlin et al., 2013). More recently, an updated meta-analysis of 95 studies reported a PTSD prevalence of 20.3% under the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revised*

(DSM-IV-TR) (APA, 2000) criteria and 12.0% under DSM-5 criteria<sup>1</sup> among trauma-exposed children and adolescents (Visser et al., 2025). These aggregate estimates, however, obscure a critical and consistent finding across the literature: the likelihood of developing PTSD is not uniform across trauma types.

Interpersonal violence is most predictive of PTSD: U.S. teenagers exposed to rape (39.3%), kidnapping (37.0%), or physical abuse (25.2%) were significantly more likely to develop PTSD compared to trauma-exposed teenagers who experienced other traumas (McLaughlin et al., 2013). These are conditional rates, meaning they represent the proportion of individuals who developed PTSD among those who experienced that specific trauma. Even higher conditional rates were reported following sexual (74.1%) or physical assault (61.0%) in a birth cohort of U.K. teens (Lewis et al., 2019). Across studies, an estimated 30-70% of teens exposed to physical or sexual assault or abuse meet diagnostic criteria for PTSD.

Youth in conflict zones face particularly high risk. A meta-analysis of children and adolescents exposed to war and mass violence reported a pooled PTSD prevalence of 47%, with rates among former child soldiers ranging from 35% to 97% (Attanayake et al., 2009; Derluyn et al., 2004).

PTSD risk is also shaped by individual vulnerability factors. Among the most consistent is sex: female teenagers are two to three times more likely than males to develop PTSD, even after controlling for trauma type and severity (Breslau et al., 2004;

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<sup>1</sup> The diagnostic criteria for PTSD were revised in the DSM-5 resulting in several substantive changes from the DSM-IV framework. Most notably, the DSM-5 restructured PTSD into four symptom clusters compared to the three clusters used in DSM-IV (APA, 2013). The total number of symptoms increased from 17 to 20, and criterion A2, which required the person to respond to the trauma with intense fear, helplessness, or horror, was eliminated to improve diagnostic reliability. The definition of qualifying traumatic events was also broadened to more clearly include indirect exposure and to clarify exclusions. In addition, the DSM-5 added specifier criteria for PTSD with dissociative symptoms and for delayed onset.

Kilpatrick et al., 2003; McLaughlin et al., 2013). Pre-existing mental health conditions, such as anxiety, depression, and externalizing disorders, further heighten vulnerability by impairing emotion regulation and increasing reactivity to stress (Copeland et al., 2007; Koenen et al., 2007, 2008; Storr et al., 2007).

Taken together, these findings highlight that trauma exposure is a common experience during the teenage years that often results in PTSD, especially in females and adolescents with pre-existing mental health disorders. As the next section outlines, the development of PTSD during this critical developmental period carries serious and far-reaching consequences for teenagers' wellbeing.

### **1.1.2 Impact and Consequences**

PTSD during the teenage years is associated with a wide range of adverse outcomes, many of which persist well into adulthood. In addition to the core symptoms of PTSD, such as re-experiencing, avoidance, negative mood and cognition, and heightened arousal, teenagers with PTSD are also at elevated risk for psychiatric comorbidities, including major depressive disorder, generalized anxiety disorder, and externalizing behaviors such as aggression, conduct problems, and oppositional defiance (Alisic et al., 2014; Copeland et al., 2007; Lewis et al., 2019). These co-occurring conditions compound the psychological burden of PTSD, contribute to greater functional impairment, and are more difficult to treat when PTSD remains unresolved.

Substance use is also more prevalent among teenagers with PTSD. Greater PTSD symptom severity is associated with earlier initiation of alcohol and drug use, more frequent and intense use, and higher rates of substance use disorders (Kilpatrick et al., 2003; Kirsch & Lippard, 2022; McCart et al., 2012; Vermeiren et al., 2003). For many

adolescents, substances may serve as a maladaptive strategy for managing PTSD-related distress, particularly symptoms of hyperarousal and intrusive re-experiencing. However, substance use often reinforces avoidance, exacerbates emotional dysregulation, and increases the risk of revictimization and additional trauma exposure (Kilpatrick et al., 2003); for some, substance use results in the development of a substance use disorder.

Suicidality is a particularly concerning outcome among teenagers with PTSD. Compared to both trauma-exposed peers without PTSD and those without trauma histories, adolescents with PTSD are significantly more likely to report suicidal ideation, suicide attempts, and non-suicidal self-injury (Alisic et al., 2014; McLaughlin et al., 2013). In Canada, suicide remains the second leading cause of death among individuals aged 15 to 24, underscoring the urgency of timely detection and intervention (Statistics Canada, 2022). Although the current study excluded individuals with active suicidality, future research should examine whether the intervention, once its safety and acceptability are firmly established, may also help reduce suicide-related outcomes.

PTSD also impairs academic and vocational functioning. Trauma-related symptoms such as hypervigilance, irritability, avoidance, and concentration difficulties can interfere with classroom learning, increase behavioral disruptions, and diminish the ability to maintain peer and teacher relationships (De Bellis et al., 2013; Pat-Horenczyk et al., 2007). Over time, PTSD can also interfere with academic attainment and career trajectories. For example, in a population-based Swedish cohort, adolescents diagnosed with PTSD were significantly less likely to complete secondary or postsecondary education, even after adjusting for sociodemographic and clinical covariates (Polimanti et al., 2019). Similarly, a longitudinal study in the U.K. found that maltreated adolescents

were more than twice as likely to leave school with low qualifications and to be disengaged from education, employment, or training by age 18 (Jaffee et al., 2013). These disruptions in education attainment can contribute to reduced career opportunities and socioeconomic disadvantage in adulthood.

In addition to academic difficulties, adolescents with PTSD often experience substantial impairments in their social and interpersonal functioning. For example, a clinical study of adolescent girls with sexual abuse-related PTSD found that greater PTSD symptom severity predicted poorer social competence and difficulty maintaining friendships (McLean et al., 2013). A recent systematic review of 92 studies similarly concluded that childhood trauma exposure is associated with having fewer friends and lower peer status during adolescence (Wang et al., 2024). Likewise, community-based studies show that trauma-exposed youth, particularly those who have experienced parental physical abuse, may occupy dual roles within their peer networks, functioning as both victims and perpetrators of aggression (Favre et al., 2024). These individuals are significantly more likely to experience peer rejection, revictimization, and are also at increased risk of engaging in aggressive behavior toward peers (Favre et al., 2024). These social difficulties, in turn, erode access to protective support networks (a key buffer fostering resilience) and heighten the risk of ongoing isolation and disengagement from normal developmental opportunities (Almeida et al., 2021; Muyswinkel et al., 2024).

The physiological and neurobiological effects of PTSD are also well-documented. Dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis is common, leading to abnormal cortisol patterns, increased systemic inflammation, and elevated risk for cardiometabolic disorders (De Bellis et al., 2013). Teenagers with PTSD are also more

likely to report somatic complaints such as gastrointestinal issues, sleep disturbances, and chronic pain (Lewis et al., 2019; Mellman et al., 1995). These physical health challenges can reinforce psychological distress and further impair quality of life.

The cumulative burden of teen PTSD extends beyond individual suffering; it places significant strain on public systems. In Canada, childhood trauma is associated with greater use of emergency and inpatient care, higher rates of medication use, and ongoing mental health service needs (Afifi et al., 2016). One estimate places the annual economic burden of child maltreatment, including healthcare costs, lost productivity, and justice system involvement, at over \$21 billion USD (Fang et al., 2012; Wekerle, 2011). Teenagers with untreated PTSD are more likely to interact with high-cost systems such as child protection, youth justice, and acute psychiatric care. Left unaddressed, PTSD can contribute to the intergenerational transmission of trauma and perpetuate long-standing health and social inequities. These findings underscore the urgent need for early, effective, and accessible intervention, not only for improving individual outcomes, but also for reducing the broader societal burden of trauma.

## **1.2 Theoretical Models of PTSD and Recovery**

The development and maintenance of PTSD can be understood through several psychological theories, each of which highlights mechanisms that are often targeted in trauma-focused interventions. These theories converge on the role of memory, avoidance, and emotional processing in shaping trauma responses, and they provide a conceptual foundation for expressive writing approaches such as Written Exposure Therapy (WET) (Sloan & Marx, 2019).

Emotional Processing Theory (EPT) remains one of the most influential frameworks for understanding PTSD (Foa & Kozak, 1986). EPT posits that trauma leads to the formation of a pathological fear structure in memory that includes sensory, emotional, cognitive, and physiological representations of the traumatic event. This structure becomes overgeneralized and is easily triggered by trauma reminders, even when they pose no actual current threat. Avoidance (both behavioral and cognitive) prevents individuals from accessing and modifying this fear structure, thereby maintaining symptoms. According to EPT, effective treatment requires direct engagement with the fear network through repeated and structured exposure to trauma-related cues in a safe context (Sloan & Marx, 2019). Importantly, the theory holds that therapeutic change is indexed by the initial elicitation of distress, which signals that the pathological structure has been adequately accessed (Sloan & Marx, 2024). This emotional engagement is considered a necessary precursor to habituation, disconfirmation of beliefs, and integration of the trauma into autobiographical memory.

Cognitive models of PTSD, such as the framework proposed by Ehlers and Clark (2000), emphasize the role of maladaptive appraisals and fragmented trauma memories. These models suggest that PTSD persists when individuals interpret the trauma or its consequences as ongoing threats and when trauma memories are poorly integrated (i.e., disorganized, sensory-laden, and disconnected from context). This results in persistent hypervigilance and re-experiencing. Recovery involves reconstructing the trauma memory into a coherent, verbally accessible narrative and modifying negative appraisals (e.g., self-blame, global danger beliefs).

Expressive writing interventions, including WET, draw from these theoretical principles but are also informed by broader models of linguistic and cognitive adaptation. According to Pennebaker's inhibition theory (Pennebaker, 1997), the act of suppressing trauma-related thoughts and emotions places physiological and psychological strain on the individual. Writing about the traumatic experience may reduce this burden by facilitating disclosure, thereby decreasing internal conflict and improving emotional regulation.

Further, expressive writing is thought to promote cognitive-emotional processing by encouraging individuals to organize, label, and make meaning of their experiences. The cognitive adaptation theory suggests that meaning-making efforts, such as identifying causes, reappraising consequences, and integrating the trauma into one's life story, can foster a sense of mastery and coherence following trauma (Taylor, 1983). Studies have shown that increases in the use of cognitive-processing words (e.g., "realize," "understand," "because") across multiple writing sessions are associated with reductions in PTSD symptoms (Pennebaker et al., 2011). This pattern suggests that as individuals progress through successive writing exercises, they may gradually construct a more coherent and reflective narrative of their traumatic experience.

Expressive writing also engages narrative coherence processes – a concept rooted in developmental and clinical psychology. Coherent trauma narratives, meaning those with chronological structure, emotional elaboration, and causal connections, are more likely to support adaptive coping and reduce distress (Pennebaker et al., 2011). In contrast, fragmented, sensory-dominated accounts are associated with continued re-experiencing and avoidance.

Together, these models converge on the understanding that PTSD symptoms are sustained by avoidance of trauma-related material, distorted appraisals, and fragmented trauma memory representations. Treatments like WET are designed to directly engage these mechanisms by facilitating emotionally engaged, structured narrative processing. The following section describes evidence-based treatments for teen PTSD, highlighting where WET may offer advantages in terms of accessibility and developmental fit.

### **1.3 Barriers to Access and Engagement in Current PTSD Treatments**

A range of trauma-focused cognitive behavioral interventions, such as Prolonged Exposure (PE) (Foa et al., 2019), Cognitive Behavioral Therapy (CBT) (Beck, 2021), and Cognitive Processing Therapy (CPT) (Resick et al., 2024), and to a slightly lesser extent, Eye Movement Desensitization and Reprocessing (EMDR) therapy (Shapiro, 2018), have well-established empirical support confirmed by numerous meta-analyses (Gutermann et al., 2016; Morina et al., 2016). As a result, they are the recommended treatments in several treatment guidelines. For example, the UK National Institute for Health and Care Excellence (NICE) recommends trauma-focused cognitive behavior therapies as the first-line intervention, with EMDR to be considered for treatment-resistant adolescents (National Institute for Health Care Excellence (NICE), 2018). As another example, the International Society for Traumatic Stress Studies (ISTSS) recommends both trauma-focused cognitive behavior therapy and EMDR as first-line interventions (Bisson et al., 2019).

However, these treatments' successes in research settings have not fully translated into real-world accessibility or sustained engagement (Borntrager et al., 2013; Clark et al., 2012; Eslinger et al., 2020; Finch, Ford, Grainger, et al., 2020; Finch, Ford,

Lombardo, et al., 2020). Youth have the most unmet mental health care needs in Canada (Nelson & Park, 2006; Sukhera et al., 2017), with more than 75% not receiving the type of specialized mental health services needed (Kourgiantakis et al., 2023). Across all age groups, youth are the least likely to seek help with a Canadian survey finding 3 in 4 young people (75%) experiencing mental health symptoms had not accessed any services for help (either in person or virtual) (Health Commission of Canada, 2021; Nelson & Park, 2006). Of those who received services for mental health concerns, approximately 52% dropped out of treatment (Kourgiantakis et al., 2023).

### **1.3.1 Access Barriers**

Parents and caregivers of youth with mental health concerns, including PTSD, frequently face significant challenges navigating fragmented and poorly coordinated mental health systems. Many report being unaware of available services until their child reaches a crisis point, suggesting that care pathways are often reactive rather than preventative (Sukhera et al., 2017). In a systematic review, parents identified structural barriers, such as long waitlists, unclear referral pathways, and financial strain, as the most pressing obstacles to accessing care for their children (Reardon et al., 2017). These issues are particularly acute for families living in rural or Northern regions in Canada, where trauma-trained clinicians are often unavailable (Jong et al., 2019).

Even when services are known, affordability remains a barrier. While public mental health care is offered at no direct cost to families, there can be substantial indirect costs such as transportation and time off work by parents bringing young people to care. Timely access to trauma-specific or specialized treatments is often only available through the private sector. Despite this private system availability, high fees and lack of insurance

coverage limit access for many families, leading to long delays or limited treatment options (Kourgiantakis et al., 2022, 2023).

Adolescents themselves face a distinct set of psychological and social barriers to care. One of the most widely reported is stigma. Many youths express concern about being labeled as “crazy,” weak, or different if they attend therapy, particularly in school environments where peer visibility is high (Roberts et al., 2022; van de Water et al., 2018). These concerns may be more pronounced for boys, who are often subject to gendered expectations that discourage displaying vulnerability or emotional disclosure (Oruche et al., 2014; Thornicroft et al., 2018).

In addition, some adolescents do not perceive a need for treatment. This belief is often rooted in low mental health literacy or a preference for self-management and privacy—attitudes that reflect a normative developmental push for autonomy during adolescence (Roberts et al., 2022; Thornicroft et al., 2018). Among youth with PTSD, however, avoidance of treatment may also reflect the disorder itself. Symptoms such as emotional numbing and avoidance of trauma reminders (behavioral and cognitive) can lead individuals to actively disengage from help-seeking, even when distress is high.

Mental health providers also face limitations that constrain access to trauma-specific care. In many regions, clinicians report lacking specialized training to support adolescents with trauma histories, particularly in publicly funded settings (Kourgiantakis et al., 2023). Additionally, providers must often work within systems that are not designed to coordinate trauma services across education, health, and community sectors, which contributes to service fragmentation and inconsistent follow-through (Kourgiantakis et al., 2023). In culturally diverse communities, the lack of culturally

responsive care further undermines engagement, especially when services fail to incorporate family involvement or address intersectional identities (Fante-Coleman & Jackson-Best, 2020; Kourgiantakis et al., 2022, 2023).

### **1.3.2 Engagement Barriers**

Even after successfully initiating care, adolescents and their support systems often face significant challenges sustaining engagement with trauma-focused therapy. Low rates of ongoing participation among trauma-exposed youth are a serious concern, as poor engagement is associated with worse clinical outcomes (Kagan et al., 2023). These barriers arise not only from the emotional demands of treatment itself, but also from how therapy is delivered and experienced by teens, caregivers, and clinicians.

Many youths perceive verbally recounting traumatic events as overwhelming and unsafe, which can hinder engagement in exposure-based treatment (Roberts et al., 2022). These concerns may be intensified by fears of judgement or mistrust when disclosing trauma to unfamiliar clinicians, particularly following experiences involving breaches of safety or power (Roberts et al., 2022).

Beyond content, the format of therapy also poses challenges. For teens with PTSD, simply entering a clinical setting can be emotionally taxing. Stepping into a clinic may evoke anxiety, vulnerability, or fear of being judged, especially when associated with prior negative experiences in institutional settings. The physical act of showing up (i.e., navigating transportation, facing a waiting room, and preparing for emotionally intense conversations) demands a level of psychological readiness that many teens, particularly those experiencing avoidance, fatigue, or emotional numbing, may struggle to sustain. These demands are further compounded by academic pressures and

extracurricular commitments. For some adolescents, particularly those whose PTSD symptoms are already impairing school functioning, the idea of missing class or falling behind can create additional stress, turning each session into a perceived obstacle rather than a source of support.

Homework assignments are another common barrier. Teens report that these “homework” tasks often resemble schoolwork and feel repetitive, boring, or irrelevant to their lived experiences (Bunnell et al., 2021). For youth experiencing PTSD symptoms such as emotional numbing, poor concentration, and low motivation, these assignments can feel especially burdensome and contribute to disengagement.

Sustaining engagement in therapy also places demand on families. Weekly therapy over 12 to 25 sessions, which is typical of standard PTSD treatment protocols (Cohen et al., 2012; Simmons et al., 2021), requires reliable transportation, flexible schedules, and parental coordination. For many families, especially those managing multiple caregiving responsibilities or living in resource-constrained settings, the time commitment alone can present a major barrier to consistent participation. These logistical burdens can lead to irregular attendance, treatment delays, or dropout, regardless of clinical motivation.

Together, these limitations highlight the need for trauma interventions that are not only effective, but also brief, flexible, and responsive to the needs and preferences of teens and parents/caregivers seeking care.

### **1.3.3 Innovative Delivery Models**

In response to persistent barriers in the delivery of trauma-focused care, two key innovations, telehealth and paraprofessional coaching, have emerged as promising

modalities. Telehealth refers to the delivery of healthcare services through digital technologies, such as videoconferencing. This approach allows therapy to be delivered remotely, often in the youth's home or school, via secure digital platforms that maintain clinical fidelity while reducing many of the barriers inherent to accessing and delivering in-person treatment.

Studies demonstrate that trauma-focused Cognitive Behavioral Therapy (TF-CBT), one of the most well-supported interventions for youth with PTSD, can be effectively delivered via telehealth (Martin et al., 2023). Open trials and community-based studies report high completion rates and significant reductions in PTSD symptoms following telehealth-delivered TF-CBT, even among racially and ethnically diverse youth exposed to complex trauma (Bruce et al., 2024; Villalobos et al., 2021). In one such study, 88.6% of participants completed the full TF-CBT protocol, with nearly 97% no longer meeting diagnostic criteria for PTSD at post-treatment (Bruce et al., 2024).

Youth and caregivers consistently report high satisfaction with telehealth-based care. In a study of 60 families who received trauma therapy via videoconference, 95.5% of adolescents and 98% of caregivers said they would use telehealth again, and the vast majority preferred remote care to traveling to a clinic (Villalobos et al., 2021). Reported benefits included convenience, comfort, a strong therapeutic alliance, and a sense of being respected and heard. Critically, 84.3% of caregivers indicated their child would not have been able to attend therapy had it not been offered remotely (Villalobos et al., 2021).

Telehealth also helps address logistical barriers that disproportionately affect marginalized youth and families, such as transportation, childcare, or work-related

scheduling constraints (Goslin & Epstein, 2024). Flexibility in scheduling sessions (e.g., during school breaks, evenings, or caregiver lunch hours) has been associated with increased engagement and reduced dropout (Goslin & Epstein, 2024). Furthermore, delivering care in familiar settings such as the home may increase emotional safety, reduce stigma, and make treatment more tolerable for trauma-exposed youth (Bruce et al., 2024).

Concerns about treatment fidelity and the therapeutic process in telehealth-delivered PTSD care have been largely dispelled. Evidence shows that clinician adherence to treatment protocols, therapeutic alliance, and satisfaction are comparable to in-person modalities when sessions are delivered via secure videoconferencing (Morland et al., 2020). Telehealth also enables providers to observe youth in their home environments and tailor interventions accordingly (Morland et al., 2020). For example, by identifying trauma-related cues (such as a closed bedroom door) that can be used to design in vivo exposure tasks, like gradually approaching and entering that space.

Nonetheless, telehealth is not a universal solution. Some teens lack access to reliable internet, private spaces at home, or appropriate devices. Clinicians must be trained to navigate these challenges and manage safety and confidentiality concerns remotely (Bruce et al., 2024). Age, attention span, and externalizing behavior also require consideration, as younger children may struggle with sustained engagement via screen-based interactions (Morland et al., 2020).

Despite these limitations, synchronous telehealth represents a scalable, evidence-based approach that can substantially increase the reach of trauma therapies. By offering adolescents a potentially more accessible, flexible, and private pathway to care, telehealth

expands the menu of acceptable treatment options for youth living with PTSD, especially those who may never be willing or able to step into a traditional therapy office.

A second promising approach involves the use of paraprofessional coaches—trained laypersons, peers, or community members who deliver structured psychological interventions under the supervision of licensed clinicians. Endorsed by the World Health Organization as a task-sharing strategy to address global mental health workforce shortages, paraprofessional models offer a scalable, cost-effective complement to conventional service delivery (Xiong et al., 2019).

Paraprofessional coaching has demonstrated feasibility, acceptability, and early effectiveness in diverse trauma-affected populations. A recent scoping review identified paraprofessionals facilitating trauma interventions such as Narrative Exposure Therapy (NET) (Schauer et al., 2011), Cognitive Processing Therapy (CPT) (Resick et al., 2016), and Skills Training in Affective and Interpersonal Regulation (STAIR) (Cloitre et al., 2020), often with outcomes comparable to those delivered by clinicians (Xiong et al., 2019). Winiarski et al. (2019) found that lay providers delivering CPT in a low-resource, conflict-affected setting significantly reduced PTSD symptoms in adolescent girls exposed to sexual- and gender-based violence. Similarly, a Canadian pilot study by Olthuis et al. (2023) demonstrated that paraprofessional delivery of online NET to public safety personnel led to sustained reductions in PTSD symptoms with no adverse events reported. Therapeutic alliance scores were high, and qualitative interviews revealed that participants found coaches to be empathetic, patient, and skilled at guiding trauma processing (Olthuis et al., 2023).

Paraprofessional approaches may be particularly well suited to adolescents because they address well-documented barriers to engagement with traditional mental health services. A systematic review by Avery et al. (2024) identified several trauma-informed interventions for youth aged 4-18 that were feasibly delivered by non-clinicians, including CBT-based protocols, mindfulness, and caregiver-involved programs. Though most studies were of low to moderate quality, the review highlighted the growing promise of school- or community-based paraprofessional models in supporting trauma-exposed youth.

Relational dynamics also contribute to the potential of paraprofessional models. In studies of internet-based programs supported by coaches, adolescents and adults alike reported strong therapeutic relationships with paraprofessional providers, describing them as more relatable, less judgmental, and more emotionally accessible than traditional therapists—particularly for individuals who had previously disengaged from formal service systems (Roddy et al., 2023). Coaches were also credited with helping users understand content, clarify therapeutic tasks, and apply skills to users' own lives, all of which are key factors linked to improved engagement and retention (Roddy et al., 2023).

Nonetheless, important questions remain. Most studies of paraprofessional-delivered mental health interventions to date have been conducted in adult populations in low-resource, conflict-affected settings, and relatively few have examined paraprofessional delivery of exposure-based interventions in adolescent samples (McGrath et al., 2022; Ryan et al., 2021). However, emerging evidence has found that brief trauma interventions delivered by trained laypersons showed early promise in a youth samples (Ertl et al., 2011; Gordon et al., 2008), supporting further research in this

direction. There is also a need to determine the optimal training, supervision, and role boundaries for paraprofessionals delivering trauma care (Avery et al., 2024).

Together, telehealth and paraprofessional coaching offer adaptable, lower-barrier delivery strategies that may better align with the realities of certain adolescents, particularly those facing logistical, psychological, or relational barriers to accessing and/or persisting with traditional therapy. These approaches preserve the therapeutic core of trauma processing—structured engagement with distressing memories—while offering greater privacy, flexibility, and developmental fit. The next section introduces WET—a brief, manualized intervention that may be particularly well suited for delivery through these emerging models.

#### **1.4 Written Exposure Therapy (WET)**

WET is a brief, exposure-based intervention designed to reduce PTSD symptoms by facilitating structured, repeated engagement with trauma memories through written narrative. Grounded in EPT (Foa & Kozak, 1986), WET targets avoidance by encouraging patients to approach rather than suppress traumatic memories in a controlled and time-limited format (Sloan & Marx, 2019). Unlike traditional trauma-focused interventions, WET eliminates the need for imaginal or in vivo exposure, explicit cognitive restructuring, and homework assignments, reducing both emotional and logistical treatment burden.

The standard WET protocol consists of five weekly sessions. The first session includes psychoeducation, treatment rationale, and a 30-minute writing exercise. In sessions two through five, participants engage in repeated writing about the same traumatic event using structured prompts designed to promote emotional and cognitive

processing. Each session includes brief check-ins before and after each writing session, during which providers monitor safety, assess emotional readiness, and offer support. Starting in session two, providers also offer brief, supportive feedback on the participant's previous narrative, focused on encouraging engagement with the writing process rather than interpreting content (Sloan & Marx, 2019).

WET has demonstrated robust efficacy in adults across multiple randomized controlled trials (RCTs). A recent systematic review of 17 studies, including seven RCTs, found that WET consistently produced moderate to large reductions in PTSD symptoms (DeJesus et al., 2024). In studies comparing WET to no-treatment controls, between-condition effect sizes, which reflect group differences in symptom change from baseline to post-treatment and follow-up, ranged from  $d = 1.05$  to  $5.25$  (DeJesus et al., 2024). Notably, WET maintained efficacy across diverse populations, trauma types, and delivery settings, including remote formats.

Dropout rates in WET are substantially lower than in other trauma-focused treatments such as PE and CPT. Several studies found that WET had lower attrition than these gold-standard PTSD therapies, even among high-risk groups such as Veterans and individuals with comorbidities. For instance, dropout from WET was 6% in one study compared to 40% for CPT, and 13% versus 36% in another trial comparing WET and PE (DeJesus et al., 2024; Sloan & Marx, 2024). These findings underscore WET's feasibility and tolerability, key considerations for adolescents and other underserved populations.

Evidence for WET in adolescents remains limited but encouraging. In a case series of four Korean adolescents with PTSD, all four participants who completed the standard five-session WET protocol reported reductions in PTSD, depressive, and

dissociative symptoms. The intervention was well tolerated, and no adverse effects were reported (Yun & Lee, 2022). However, the study's small sample size, lack of a control group, and homogeneity of participants (e.g., stable family environments, no childhood abuse) limit generalizability.

A second study by Ahmadi et al. (2022) evaluated a modified version of WET (m-WET) in an RCT involving 120 Afghan (Hazara) adolescent girls who had survived a terrorist attack. Participants were randomly assigned to one of three groups: m-WET ( $n = 40$ ), TF-CBT ( $n = 40$ ), or a psychoeducation control group ( $n = 40$ ). The m-WET intervention consisted of five consecutive, group-based trauma writing sessions in a school setting without therapist involvement. At both post-treatment and three-month follow-up, the m-WET group showed significantly lower PTSD symptom severity compared to the control group. Reductions were especially pronounced for intrusion and arousal symptoms. Although promising, the modified protocol differed substantially from standard WET in terms of delivery format (group-based vs. individual), frequency (consecutive daily sessions vs. weekly), and therapeutic support, limiting the extent to which findings can be generalized to the original WET model.

Together, these preliminary studies suggest that WET may be a feasible and acceptable treatment for adolescents with PTSD. Its brevity, structured format, and minimal reliance on therapist input may address some of the key accessibility barriers associated with traditional trauma-focused interventions, but further research is needed to ensure WET is an efficacious and safe approach for teen PTSD.

Evidence from expressive writing research further supports the promise of narrative-based interventions for youth. A meta-analysis of 21 studies with adolescents

found small but consistent benefits of expressive writing across emotional, behavioral, and academic outcomes, with enhanced effects among emotionally distressed youth and those completing multiple sessions over spaced intervals (Travagin et al., 2015). Though WET differs from traditional expressive writing in its structured format and clinical support, these findings reinforce the developmental appropriateness of written disclosure as a therapeutic tool for adolescents.

In sum, WET offers a brief, structured, and resource-efficient intervention that may help address many barriers faced by adolescents with PTSD, including stigma, avoidance, and limited access to specialized mental health services. However, further research is needed to evaluate its feasibility with diverse youth populations, particularly in remote formats and when delivered by non-clinician providers.

### **1.5 Study Objectives**

The present study conducted an analysis of pre- and post-treatment data from a subset of participants enrolled in an ongoing randomized feasibility trial of telehealth-delivered WET for teenagers with PTSD (i.e., the first 5 participants in the trial). This study aimed to generate preliminary evidence regarding the feasibility, clinical utility, and tolerability of a telehealth-based, paraprofessional-delivered implementation of WET.

The primary objective was to assess the feasibility of both the trial design and the intervention delivery model. Trial feasibility was evaluated through metrics such as recruitment rate, screening yield, eligibility proportion, enrollment rate, retention, and data completeness. Intervention feasibility focused on treatment adherence (i.e., session attendance and intervention completion), implementation fidelity by paraprofessionals,

and the practicality of delivering WET via telehealth by paraprofessional coaches. It was hypothesized (H1) that the intervention would demonstrate adequate feasibility, defined by high session attendance and completion rates, and dropout rates comparable to or below those observed in previous WET trials (i.e., < 25%; Sloan & Marx, 2024). Recruitment feasibility was examined exploratorily, given uncertainty about the responsiveness of adolescents with PTSD to outreach efforts for a telehealth-based, paraprofessional coach-delivered psychotherapy study. Analyses explored referral sources, recruitment timelines, and demographic variation in uptake to inform future trial optimization.

The secondary objective was to examine within-person clinical change across the treatment period for participants in both the immediate WET group and waitlist control groups. Outcomes included PTSD symptoms, depression, anxiety, and functional impairment, measured pre- and post-treatment. Given the limited sample size, these analyses focused on identifying individual patterns of symptom change and the potential for clinically meaningful improvement. It was hypothesized that (H2a) participants receiving WET would demonstrate improvement in at least one symptom domain, while (H2b) participants in the waitlist control group would show minimal or no change.

The tertiary objective was to explore preliminary between-group differences in symptom trajectories by comparing outcomes for participants in the immediate WET group versus those in the waitlist control condition. Although not powered for formal efficacy testing, this analysis was intended to assess preliminary signals of differential response to treatment across the two groups. It was hypothesized (H3) that the immediate

treatment group would exhibit greater reductions in PTSD, depression, anxiety, and functional impairment relative to the waitlist group.

Two exploratory objectives focused on participants in the immediate WET group. The first was to examine changes in subjective distress before and after each writing exercise during every session. This repeated-measures design allowed for tracking both within-session emotional reactivity and between-session trends across the course of treatment, providing proxies for emotional engagement and habituation, respectively. The second exploratory objective involved monitoring substance-related cravings before and after each writing exercise. These momentary assessments captured fluctuations in craving for alcohol or cannabis within-session and at a session-by-session level. These exploratory aims were intended to provide early insights into treatment tolerability and mechanisms of emotional processing, and to inform future adaptations for substance-involved populations.

### **1.5.1 Significance**

This study addresses a critical gap in youth mental health research by piloting an integrated and scalable model of care for adolescents with PTSD. By combining a brief, evidence-based intervention (i.e., WET) with telehealth delivery and paraprofessional coaching, this study offers an innovative response to longstanding challenges in accessibility, service capacity, and treatment engagement for PTSD interventions among trauma-exposed youth.

Using a controlled case series design embedded within a randomized feasibility trial, the study employs a within-subjects analytic framework to characterize individual symptom trajectories across a small sample of adolescents randomized to immediate

WET or a 5-week waitlist control condition. This design enables both the descriptive exploration of group-level patterns and an analysis of individual-level variability in treatment response. Although preliminary, the findings contribute to the early evidence base for brief, exposure-based interventions adapted for remote delivery in real-world adolescent populations. The results offer direction for future controlled trials and inform the iterative development of accessible trauma-focused interventions for underserved youth.

## CHAPTER 2 – METHODS

### 2.1 Study Design

This study employed a controlled case series design, embedded within an ongoing randomized feasibility trial of telehealth-delivered WET by paraprofessional coaches for adolescents with PTSD. Analyses were limited to participants enrolled at the time of thesis submission. This design was selected to evaluate the feasibility of the intervention and trial procedures, while also allowing for within-subject examination of individual symptom change, and preliminary descriptive comparisons between the immediate treatment and waitlist control groups.

### 2.2 Study Setting

All study activities were coordinated through the Centre for Research in Family Health at the IWK Health Centre, an academic pediatric hospital located in Halifax, Nova Scotia, Canada. The study was conducted entirely remotely to maximize accessibility for adolescents across Nova Scotia and other Canadian provinces and territories.

The intervention itself was delivered synchronously via Zoom for Healthcare, a secure, encrypted videoconferencing platform approved by the IWK Health Centre and Nova Scotia's Department of Health and Wellness for clinical and research purposes. This platform complies with Canadian data protection laws, including the *Personal Information Protection and Electronic Documents Act* (PIPEDA) and the *Personal Health Information Act* (PHIA), ensuring the confidentiality and security of all videoconferencing sessions (Government of Canada, 2000).

All self-report survey procedures, including eligibility screening, informed consent, baseline, and post-intervention assessments, were completed independently by

participants using Research Electronic Data Capture (REDCap) (Harris et al., 2009, 2019). REDCap is a secure, web-based application designed for managing online surveys and research data, widely used in clinical and behavioral health research. It offers secure user authentication, audit trails, and flexible survey scheduling features that allow participants to complete assessments at their convenience while maintaining data integrity and compliance with institutional privacy standards.

### **2.3 Participants**

To be eligible for the study, individuals were required to meet the following inclusion criteria:

- a) Be between 13 and 19 years of age at the time of enrollment.
- b) Report lifetime exposure to at least one potentially traumatic event, defined according to DSM-5-TR Criterion A for PTSD (American Psychiatric Association, 2022), evaluated using the Life Events Checklist for the DSM-5 (LEC-5; Gray et al., 2004).
- c) Meet criteria for full or subthreshold PTSD based on the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013). Scores between 31 and 33 were considered indicative of subthreshold PTSD, while scores above 33 indicated probable PTSD.<sup>2</sup>
- d) Be fluent in spoken and written English.

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<sup>2</sup> This classification is based on prior validation studies demonstrating that a total PCL-5 score in the 31-33 range optimally balances sensitivity and specificity for identifying subthreshold PTSD, while scores above 33 are more indicative of clinical PTSD, in both clinical and community samples (Forkus et al., 2022). This threshold was applied to the total symptom severity score. Participants were not required to meet the DSM-5 diagnostic algorithm, which specifies minimum symptom counts within each of the four PTSD symptom clusters – specifically, at least: one intrusion symptom (Criterion B), one avoidance symptom (Criterion C), two negative alterations in cognition and mood symptoms (Criterion D), and two arousal and reactivity symptoms (Criterion E).

- e) Have access to a stable internet connection and a private, distraction-free setting suitable for participating in remote telehealth sessions.

Participants were excluded from the study if they met any of the following criteria:

- a) Endorsed active suicidal ideation or reported a suicide attempt within the past six months, as assessed by the Patient Safety Screener (PSS-3; Boudreaux et al., 2015). The WET manual emphasizes that if a client is determined to be at high suicide risk or an imminent danger to self or others, these issues should be addressed first through hospitalization or an appropriate risk management plan before initiating WET (Sloan et al., 2019). While PTSD treatment may reduce suicidality over time, WET is not designed to manage acute suicide risk, making exclusion necessary to ensure participant safety.
- b) Screened positive for psychotic symptoms on a brief, two-item validated screener for early psychosis (Phalen et al., 2018). The WET manual states that active psychotic disorders should be stabilized before beginning WET, as these conditions can interfere with the structured narrative-based work and may require specialized care (Sloan et al., 2019).
- c) Had initiated or experienced a dosage change in any psychotropic medication with the past 12 weeks, to minimize confounding from symptom fluctuations associated with medication titration or early-phase pharmacological response.

- d) Were currently engaged in trauma-focused psychotherapy or counselling (e.g., TF-CBT, EMDR, PE) outside the study. Concurrent trauma-focused treatment could introduce confounding therapeutic effects, making it difficult to isolate the impact of the study intervention.

These criteria were designed to balance scientific rigor with ethical responsibility, ensuring that participants could safely engage in the intervention without concurrent factors that might obscure interpretation of feasibility or preliminary clinical outcomes.

## **2.4 Enrollment Procedures**

### **2.4.1 Recruitment**

Recruitment took place between March and June 2025 using a multimodal recruitment strategy designed to reach a diverse population of adolescents across Canada. Recruitment efforts included community outreach (i.e., collaboration with school boards, youth-serving organizations, and community health centers), clinical referrals, digital advertisements distributed via popular social media platforms (e.g., Instagram and Facebook), and print posters placed in relevant community locations (e.g., clinics, libraries, schools).

Interested individuals were directed to a study-specific webpage, where they completed a brief contact form hosted on REDCap. This form collected basic contact information and indicated preliminary interest in participation. Within one business day of contact form submission, a member of the research team reached out via email (and phone, if needed) to provide a brief introduction to the study and to schedule a 30-minute virtual information session. This email included a copy of the informed consent form for participants and caregivers to review in advance.

Information sessions were conducted live via Zoom for Healthcare. A trained research team member led each session and provided: a plain-language explanation of the study's objectives, procedures, duration, potential risks and benefits; clarification of voluntary participation, confidentiality, and withdrawal procedures; and opportunities to ask questions and seek clarification. The information session also enabled a research team member to assess the prospective participant's capacity to provide informed consent. To do so, the research team member asked a series of yes/no and open-ended questions about the study's purpose, procedures, risks and benefits, and voluntary nature, after these items had been explained to the youth.

Participation of a non-offending (in cases of parental abuse) parent or caregiver during the information session was optional. The purpose of the session was to ensure prospective participants fully understood the study and could make an informed decision regarding enrollment.

#### **2.4.2 Consent Process**

Following the virtual information session, interested participants were emailed a secure REDCap survey link containing the electronic informed consent form. For participants identified as lacking the capacity to provide informed consent, caregiver consent and participant assent were both required. Completion of the informed consent survey triggered automatic progression to the eligibility screening process (described in Section 2.4.3).

#### **2.4.3 Screening and Baseline Survey**

Following electronic consent, participants were automatically directed within REDCap to complete the 2- to 5-minute eligibility screening questionnaire. This

screening instrument evaluated each participant against the study's predefined inclusion and exclusion criteria (outlined in Section 2.3).

Participants who met eligibility criteria were automatically advanced within the REDCap platform to complete the baseline survey, which consisted of four components:

1. A demographic survey collecting information on age, sex assigned at birth, gender identity, ethnicity, and ability/disability status.
2. A structured item asking participants to identify the single worst event they had experienced from among those endorsed on the LEC-5. This event served as the provisional index trauma for the intervention.
3. A battery of validated self-report measures assessing clinical outcomes of interest, including PTSD symptoms, depression, anxiety, and functional impairment.
4. Substance use and craving history. Specifically, participants were asked whether they had ever used alcohol or cannabis (yes/no for each). For each substance endorsed, they were then asked whether they experienced any non-cue-elicited (baseline) cravings for that substance (yes/no). Alcohol and cannabis were selected given their high prevalence and strong associations with trauma exposure and PTSD symptoms among adolescents (Tucker et al., 2022).

The baseline survey was designed to be completed in approximately 10 minutes. Participants were permitted to pause and return to the survey to accommodate attention, fatigue, or scheduling constraints.

Ineligible participants were shown a customized message within REDCap. Those ineligible for general reasons (e.g., did not meet symptom thresholds) were thanked for their interest and provided with a list of national and provincial/territorial mental health resources. Those excluded for safety-related reasons, such as active suicidal ideation, recent suicide attempts, or a positive screen for psychosis symptoms, were immediately shown an enhanced safety message within REDCap. This message urged participants to seek immediate support and included step-by-step instructions to contact local crisis services (e.g., 911 or the nearest hospital emergency department). Additionally, participants were provided with direct links to national youth mental health resources, including Kids Help Phone and the 988 Suicide Crisis Helpline, to ensure access to immediate, confidential support.

#### **2.4.4 Randomization**

Eligible participants were randomized in a 1:1 allocation ratio to either the immediate intervention group or a waitlist control group. Randomization was implemented using the secure, automated randomization module in REDCap, which ensured allocation concealment and prevented researcher influence over group assignment.

To balance key demographic variables, stratified block randomization was used. Stratification was based on two variables: age group (13-15 years; 16-19 years) and sex/gender (female/girl, male/boy, other [e.g., intersex or gender-diverse]). This inclusive categorization approach aligns with best practices for representing both biological sex and gender diversity, ensuring that participants who do not identify strictly as male or female (e.g., transgender, non-binary, or intersex individuals) are appropriately classified.

Stratification helped ensure comparability between groups and minimized the risk of confounding effects related to these characteristics. Following randomization, participants received an email informing them of their group assignment and a schedule of their upcoming telehealth-delivered WET sessions.

## **2.5 Intervention Procedures**

WET was delivered over five weekly sessions, each lasting approximately 40 to 60 minutes, via Zoom for Healthcare. The intervention adhered to the standardized treatment manual developed by Sloan and Marx (2019) and was facilitated by paraprofessional coaches under the supervision of a licensed clinical psychologist.

Each WET session followed a consistent and structured format. Sessions began with a brief check-in (approximately 5-10 minutes), during which the coach confirmed the participant's readiness, reviewed safety, and offered emotional support as needed. Immediately before and after the writing task, participants were asked to report their level of subjective distress. During each intervention session, participants who had endorsed both prior use and craving for a given substance were also asked to rate their current craving intensity for that substance. These responses were used to monitor emotional engagement and intervention tolerability over time.

Participants then engaged in a 30-minute trauma-focused writing task, guided by weekly prompts designed to encourage progressive emotional processing of a single traumatic event. Prompts varied across sessions to promote deeper reflection on the event's emotional, cognitive, and sensory dimensions. At baseline, participants completed the LEC-5 and identified their "worst" experienced event, which was designated as the provisional index trauma. In the first session, this selection was briefly reviewed and

confirmed in discussion with the coach, following the WET manual guidelines. During each writing period, participants were instructed to keep their cameras and microphones on to allow for ongoing monitoring and ensure safety, a protocol explained in advance in the informed consent form and during the information session. Coaches remained present in the Zoom meeting, but turned their cameras and microphones off to preserve participant privacy while maintaining the ability to intervene if needed.

Following the writing period and post-writing subjective distress and substance use craving ratings (if applicable), a second check-in was conducted. Coaches used this time to help participants process the writing experience using open-ended questions (e.g., “How did it feel to write today?”), assess current emotional state, and ensure participants felt grounded before concluding the session. Participants were then asked to send a photo of their written narrative to their coach via secure email, either during the session or immediately afterward. Coaches reminded participants to do so before the session ended to help ensure timely receipt and completeness of transcripts for documentation and supervision purposes. For sessions 2 through 5, coaches provided brief verbal feedback on the previous week’s narrative during the following session’s initial check-in.

### **2.5.1 Session Fidelity Monitoring**

To promote and document fidelity to the WET protocol, paraprofessional coaches completed a standardized session adherence checklist following each WET session. The checklists were developed by the first author and incorporated core elements from the treatment manual by Sloan and Marx (2019), including the session script. Each session had its own tailored checklist, which included: (a) specific Zoom for Healthcare setup tasks (e.g., testing audio and video, ensuring the camera was on and positioned at or

slightly above eye level, closing any applications that might trigger pop-ups), (b) an attendance item, (c) space to record SUDS and craving scores, (d) treatment scripts verbatim from the WET manual, (e) a reminder to prompt the participant to submit a photo of their written narrative, and (f) an adverse event reporting form. Each checklist also provided space for coaches to record session-specific observations, such as participant engagement, emotional responses, or any technical or safety concerns. Completed checklists were reviewed regularly by the supervising clinical psychologist to monitor protocol fidelity and ensure consistency across coaches and participants. This process supported quality assurance and allowed for timely identification of training needs or implementation challenges.

Emerging evidence suggests that coach self-report measures of fidelity can provide valid estimates of adherence (Tagavi et al., 2023). For instance, in youth mental health interventions delivered by non-specialist coaches, self-rated session fidelity scores have been found to significantly correlate with independent observer ratings of fidelity ( $r = .43, p = .02$ ) (Tagavi et al., 2023). These findings support the use of coach-completed fidelity checklists as a pragmatic and informative strategy for monitoring protocol adherence in trauma-focused interventions and other mental health programs.

### **2.5.2 Paraprofessional Coach Training and Supervision**

As part of the larger ongoing feasibility trial, four paraprofessional coaches were trained to deliver the intervention. The team included a clinical scientist with expertise in youth mental health and trauma interventions, a master's-level graduate student in psychiatry research (the first author), a paraprofessional provider with prior experience delivering digital mental health programs through the Strongest Families Institute (a

national organization specializing in remote, evidence-based services for children, youth, and families), and a registered mental health counsellor. For the present study, all participants were seen by the same coach due to scheduling availability.

All four coaches completed a structured training program prior to delivering WET. Training consisted of four three-hour workshops facilitated by a licensed clinical psychologist and included: (a) an overview of PTSD and trauma-informed care; (b) instruction on the principles and procedures of WET; (c) ethics, confidentiality and boundaries; and (d) risk assessment and response protocols for suicidality, distress, or safety concerns. Training was interactive, incorporating didactic content, case studies, role-play exercises, and mock sessions to build skill and confidence.

Coaches also participated in weekly group supervision meetings throughout the intervention phase, led by the supervising clinical psychologist. These meetings provided a structured space to review session experiences, address participant concerns, and troubleshoot implementation challenges. Coaches were encouraged to discuss adherence questions, emotional responses, and fidelity dilemmas in supervision to ensure consistent, ethical, and protocol-aligned delivery.

## **2.6 Measures**

### **2.6.1 Trauma Exposure and PTSD Symptom Severity**

Trauma exposure was assessed using the LEC-5, a 17-item self-report instrument developed by the National Center for PTSD to identify exposure to potentially traumatic experiences (Gray et al., 2004). The measure includes 16 predefined Criterion A events based on DSM-5 diagnostic criteria (e.g., physical assault, serious accident) and one open-ended item for reporting other extraordinarily stressful experiences. For each event,

participants indicate their type of exposure: whether the event happened to them directly, they witnessed it, learned about it happening to someone close, and/or were exposed to it through their work. Responses to the open-ended item were reviewed by the research team to determine whether they met Criterion A criteria. Events not scored on the LEC-5 or those that did not meet DSM-5 Criterion A (e.g., academic stress, romantic breakups) were not considered sufficient for study inclusion. Following completion of the LEC-5, participants were presented with an item asking them to identify the single worst event they had experienced among those they endorsed. This event was designated as the provisional index trauma for the intervention.

PTSD symptom severity was measured using the PCL-5, a 20-item self-report measure that assesses the frequency of DSM-5 PTSD symptoms over the past month (Weathers et al., 2013). Items are rated on a 5-point scale from 0 (“Not at all”) to 4 (“Extremely”), yielding a total score potentially ranging from 0 to 80, with higher scores indicating greater symptom severity. Based on established cutoffs (Blevins et al., 2015), total scores below 31 were classified as non-clinical, scores between 31 and 33 were considered indicative of subthreshold PTSD, and scores above 33 were used to identify probable clinical PTSD.

The PCL-5 has demonstrated strong psychometric properties in both adult and adolescent samples. Internal consistency has been reported as good to excellent ( $\alpha = .83$  to  $.97$ ) (Forkus et al., 2023), and test-retest reliability over intervals of 1 to 6 weeks ranges from  $r = .58$  to  $.91$  (Blevins et al., 2015). The scale also shows strong construct validity, including convergent, discriminant, and concurrent validity (Forkus et al., 2023).

### **2.6.2 Anxiety Symptoms**

Anxiety symptoms were assessed using the Generalized Anxiety Disorder-7 (GAD-7), a 7-item self-report instrument that assesses the frequency of generalized anxiety symptoms over the past two weeks (Spitzer et al., 2006). Each item is rated on a 4-point scale from 0 (“Not at all”) to 3 (“Nearly every day”), producing a total score potentially ranging from 0 to 21. Higher scores indicate greater symptom severity. Standard severity classifications are as follows: 0 to 4 reflects minimal anxiety, 5 to 9 indicates mild anxiety, 10 to 14 reflects moderate anxiety, and 15 or higher suggests severe anxiety (Pérez-Pedrogo et al., 2022). The GAD-7 has demonstrated strong psychometric properties, including excellent internal consistency, and validity in adolescent samples (Casares et al., 2024; Pérez-Pedrogo et al., 2022).

### **2.6.3 Depression Symptoms**

Depressive symptoms were measured using the Patient Health Questionnaire-9 (PHQ-9), a 9-item self-report instrument that assesses the frequency of depressive symptoms over the past two weeks (Kroenke et al., 1999). Each item corresponds to a diagnostic criterion for major depressive disorder in the DSM and is rated on a 4-point scale from 0 (“Not at all”) to 3 (“Nearly every day”), yielding a total score potentially ranging from 0 to 27. Higher scores reflect greater symptom severity.

Standard interpretive guidelines classify total scores as follows: 0-4 (minimal), 5-9 (mild), 10-14 (moderate), 15-19 (moderately severe), and 20-27 (severe) depression (Kroenke et al., 2001). For adolescents, a cutoff score of  $\geq 11$  has been recommended to identify probable major depressive disorder, with a reported sensitivity of 89.5% and specificity of 77.5% (Richardson et al., 2010).

The PHQ-9 has demonstrated strong psychometric properties in adolescent samples, including good internal consistency ( $\alpha = .87$  to  $.91$ ) and construct validity (Andreas & Brunborg, 2017; Fonseca-Pedrero et al., 2023).

#### **2.6.4 Functional Impairment**

Functional impairment was evaluated using the 3-item Sheehan Disability Scale (SDS) (Sheehan & Sheehan, 2008), a self-report measure designed to evaluate the degree to which psychological symptoms interfere with functioning in three core domains: school or work, family life, and social activities. Each item is rated on a visual analog scale from 0 (“no impairment”) to 10 (“extreme impairment”), yielding a total score potentially ranging from 0 to 30. Higher scores reflect greater overall impairment. Total scores are commonly interpreted using the following severity ranges: 0-5 indicates minimal or no impairment, 6-15 reflects moderate impairment, and 16-30 indicates marked or severe impairment (Sheehan & Sheehan, 2008).

The 3-item SDS has demonstrated strong psychometric properties in adolescent clinical samples, including excellent internal consistency, good test-retest reliability, and evidence of construct validity, particularly among youth with mood and anxiety disorders (DiFonte et al., 2024; Sheehan & Sheehan, 2008).

#### **2.6.5 Subjective Distress**

Session-level emotional arousal was assessed using Subjective Units of Distress Scale (SUDS) (Wolpe, 2018). Participants rated their current level of distress on a scale from 0 (“no distress”) to 100 (“extreme distress”). SUDS ratings were collected immediately before and after each WET writing task to monitor emotional responses to

trauma processing. This procedure follows the protocol recommended in the WET treatment manual (Sloan & Marx, 2019).

### **2.6.6 Substance Use Cravings**

At baseline, participants were asked whether they had ever used alcohol and cannabis (yes/no for each). For each endorsed substance, they were then asked whether they ever experienced cravings for that substance (yes/no). Only participants who reported both a history of substance use and of craving for a given substance were asked to complete craving ratings during the intervention phase. This approach was based on the rationale that it would only be meaningful to assess fluctuations in craving during trauma writing among individuals who were already familiar with the subjective experience of substance craving.

We opted to use a brief, craving-specific screener rather than a comprehensive substance use severity instrument because the primary aim was not to evaluate substance use disorder risk or patterns of consumption, but rather to capture potential changes in craving as a marker of intervention tolerability, given prior findings that writing about a personal trauma can elicit substance craving (DeGrace et al., 2025). This approach minimized participant burden while allowing for targeted monitoring of a relevant risk domain.

In-session momentary craving intensity for alcohol and/or cannabis were assessed using the single-item Craving Thermometer (Back et al., 2015). Eligible participants rated their current level of craving for alcohol and/or cannabis immediately before and after each WET writing exercise. Ratings were recorded on a visual analog scale ranging

from 0 (“No craving”) to 100 (“Extreme craving”). These repeated assessments were used to monitor within- and across-session fluctuations in craving.

**Table 1**

*Reliability Coefficients (Cronbach’s alpha)*

Instrument	Reliability (Cronbach’s Alpha)	Source
LEC-5	.67 - .70	(Tari & Wong, 2024)
PCL-5	.80 - .97	(Blevins et al., 2015; Forkus et al., 2023; Ghazali & Chen, 2018; Mordeno & Luzano, 2023; Yang et al., 2025)
PHQ-9	.74 - .87	(Andreas & Brunborg, 2017; Beard et al., 2016; Fonseca-Pedrero et al., 2023; Richardson et al., 2010; Tsai et al., 2014)
GAD-7	.78 - .92	(Casares et al., 2024; Pérez-Pedrogo et al., 2022; Tiirikainen et al., 2019)
SDS	.81	(Soler et al., 2021)
SUDS	—	—
CT	—	—

*Note.* LEC-5 = Life Events Checklist for DSM-5 (Gray et al., 2004); PCL-5 = PTSD Checklist for DSM-5 (Weathers et al., 2013); PHQ-9 = Patient Health Questionnaire-9 (Kroenke et al., 1999); GAD-7 = Generalized Anxiety Disorder-7 (Spitzer et al., 2006); SDS = Sheehan Disability Scale (Sheehan & Sheehan, 2008); SUDS = Subjective Unit of Distress Scale (Wolpe, 2018); CT = Craving Thermometer (Back et al., 2015); — = not applicable (single-item measure).

## 2.7 Data Analysis

### 2.7.1 Feasibility of Trial Procedures and Intervention Delivery

For the primary objective, feasibility was assessed through descriptive analyses organized into two domains: recruitment feasibility and intervention feasibility.

Recruitment feasibility was evaluated by calculating the recruitment rate (i.e., the number of prospective participants who completed the consent-to-contact form), the number of prospective participants who attended the information session, screening yield (i.e., the proportion of individuals who underwent eligibility screening relative to the number who expressed interest), eligibility proportion (i.e., the proportion of those screened who met

all inclusion criteria), enrollment rate (i.e., the proportion of eligible individuals who consented and enrolled in the trial), and trial retention (i.e., the proportion of enrolled participants who completed the post-intervention assessment). Data completeness was also assessed by calculating the percentage of missing data on primary outcome measures. To explore the reach and responsiveness of different recruitment strategies, the sources of referral (e.g., clinical, community, social media) were recorded and compared descriptively. Uptake across key demographic subgroups, such as sex/gender, age, and racial identity, was examined descriptively to identify potential disparities in recruitment and participation.

Intervention feasibility was assessed using four indicators: session adherence, treatment dropout, implementation fidelity, and writing task engagement. Session adherence was defined as the number of WET sessions attended and completed by each participant. Dropout rate was calculated as the number and proportion of participants who discontinued treatment before completing all five sessions. This rate was evaluated against a pre-specified acceptability threshold of 25%, consistent with prior WET trials (Sloan & Marx, 2024). Implementation fidelity was assessed using structured adherence checklists completed by intervention coaches after each session. These checklists documented whether core treatment elements (e.g., psychoeducation, narrative writing, feedback) were delivered as intended. Writing task engagement was evaluated by analyzing word count data for each participant across all five writing sessions as a proxy for narrative completion and effort. No inferential statistics were conducted, as the feasibility analyses were descriptive and exploratory in nature. All data processing and analysis were performed using R (Version 4.5.1).

## 2.7.2 Individual-Level Symptom Trajectories and Clinical Significance

For the second objective, individual symptom trajectories were examined to assess participant-level changes in clinical outcomes across the intervention period. To assess clinically significant change at the individual level, both the Reliable Change Index (RCI) and established thresholds for minimal clinically important differences (MCIDs) were applied for each outcome measure. The RCI determines whether a participant's change in score is statistically reliable, i.e., greater than what could be expected due to measurement error alone (Jacobson & Truax, 1991). The RCI was calculated using the formula:

$$RCI = \frac{X_{post} - X_{pre}}{SE_{diff}} \quad \text{where} \quad SE_{diff} = SD_1 \times \sqrt{2(1 - r)}$$

In this equation,  $X_{post}$  and  $X_{pre}$  represent the participant's post- and pre-treatment scores,  $SD_1$  is the baseline standard deviation, and  $r$  is the internal consistency reliability (Cronbach's alpha) of the measure. Because the sample size was too small to generate stable internal consistency estimates, values from published validation studies were used for each scale. These values are reported in Table 1. For the PCL-5,  $SD = 13.40$  and  $r = .92$  (Mordeno & Luzano, 2023; Yang et al., 2025). For the PHQ-9,  $SD = 4.70$  and  $r = .84$  (Tsai et al., 2014). For the GAD-7,  $SD = 4.67$  and  $r = 0.91$  (Tiirikainen et al., 2019). For the SDS,  $SD = 7.6$  and  $r = 0.81$  (Soler et al., 2021). An RCI greater than  $\pm 1.96$  was interpreted as statistically reliable change at the 95% confidence level.

In addition to the RCI, minimal clinically important differences (MCIDs) were used to evaluate whether observed score reductions were likely to be meaningful from a clinical perspective. These thresholds represent the smallest score reductions typically perceived as beneficial. Based on prior research, a 10-point reduction on the PCL-5 was

used to indicate clinically meaningful change (Marx et al., 2022). A 5-point reduction on the PHQ-9 (Kroenke, 2012), a 4-point reduction on the GAD-7 (Toussaint et al., 2020), and a 2-point reduction on the SDS (Sheehan & Sheehan, 2008) were applied as MCID thresholds for those respective measures.

Participants were also evaluated for movement across severity categories from pre- to post-treatment (e.g., shifting from probable PTSD to subthreshold or non-clinical levels, or from moderate to mild depression). This categorical change was used as an additional indicator of clinically meaningful improvement at the individual level. Together, these indices—the RCI, MCID, and severity category shifts—provided a multidimensional approach to evaluating individual-level treatment response.

### **2.7.3 Group-Level Comparison of Symptom Change Between Conditions**

To examine group-level differences in symptom change over time, descriptive and effect size analyses were conducted for each outcome measure: PCL-5, GAD-7, PHQ-9, and SDS. Analyses focused on participants randomized to the immediate WET condition versus those assigned to a 5-week waitlist control condition.

For each measure, group means and standard deviations were calculated separately at baseline (pre-intervention) and at the post-intervention timepoint. Individual change scores were calculated by subtracting pre-intervention scores from post-intervention scores, and group-level means and standard deviations of these change scores were then summarized to characterize average symptom improvement (or worsening) in each condition. This approach allowed for descriptive evaluation of overall symptom trajectories over time.

To quantify the magnitude and direction of group differences in change, Hedges'  $g$  was calculated for each outcome. Hedges'  $g$  is a standardized mean difference statistic that expresses the size of the effect between two groups relative to the variability in the data (Lakens, 2013). It is similar in interpretation to Cohen's  $d$ , but includes a correction factor to reduce bias in studies with small sample sizes, making it particularly suitable for the present feasibility trial, which included unequal and limited group sizes ( $n = 3$  in the immediate WET group;  $n = 2$  in the waitlist group). For each clinical outcome, individual change scores (i.e., post-intervention minus pre-intervention values) were computed. The difference in the mean change scores between the immediate WET and waitlist groups was then divided by the pooled standard deviation of those change scores to produce an initial standardized effect size. However, because small samples tend to yield upwardly biased estimates of population effect sizes, Hedges'  $g$  applies a correction factor to adjust for this bias.

Mathematically, Hedges'  $g$  is defined as:

$$g = J \cdot \frac{\bar{X}_1 - \bar{X}_2}{S_p}$$

Where  $\bar{X}_1$  and  $\bar{X}_2$  are the mean change scores in the intervention and waitlist control groups, respectively.  $S_p$  is the pooled standard deviation of the change scores, calculated as:

$$S_p = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}}$$

$J$  is the bias correction factor for small samples:

$$J = 1 - \left( \frac{3}{4(n_1 + n_2 - 2) - 1} \right)$$

This adjustment factor brings the estimate of  $g$  closer to the true population value by reducing the positive bias associated with small samples (Lakens, 2013). In addition to computing Hedges'  $g$ , 95% confidence intervals were calculated for each effect size. These intervals provided a quantitative estimate of precision and helped contextualize the magnitude of observed group differences, especially in the absence of formal statistical significance testing.

Hedges'  $g$  was selected over the more commonly used Cohen's  $d$  precisely because of this correction. In small-sample studies, Cohen's  $d$  may overestimate the effect size, leading to inflated interpretations (Lakens, 2013). Hedges'  $g$ , by contrast, provides a more conservative and accurate estimate under such conditions.

Additionally, a sensitivity analysis was conducted to account for missing outcome data. As described later in our results, one participant in the immediate WET group did not complete post-intervention assessments. To evaluate the potential impact of this missing data, a conservative baseline observation carried forward approach was used, in which the participant's baseline scores were carried forward and treated as their post-intervention values (Mallinckrodt et al., 2008). This method assumes no clinical improvement and represents a worst-case scenario for treatment response. Group-level means, standard deviations, and Hedges'  $g$  effect sizes with 95% confidence intervals were then recalculated for all clinical outcomes using the imputed dataset. This analysis allowed for an evaluation of whether the primary findings were robust to assumptions about missing data.

No inferential statistical tests were conducted due to the small sample size and exploratory nature of the study. Instead, results are presented descriptively, and visual

inspection of group means and associated variability (as illustrated in Figure 3) is used to aid interpretation. This approach was chosen to balance transparency in reporting with appropriate caution given the limited power for statistical inference.

#### **2.7.4 Subjective Distress and Substance Use Cravings**

To evaluate emotional engagement and intervention tolerability, exploratory analyses examined group-level patterns in subjective distress and substance use cravings reported during each of the five WET sessions by participants in the immediate treatment group. For subjective distress, aggregate pre- and post-writing SUDS scores were summarized at each session to assess both within-session emotional reactivity (i.e., the change from pre- to post-writing) and between-session trends in pre- and post-writing scores over time. Group means were calculated separately for pre- and post-session ratings and plotted across sessions to explore patterns of affective engagement and potential habituation to trauma exposure.

For substance use cravings, analyses were limited to participants who endorsed cravings for alcohol or cannabis in the baseline assessment. Pre- and post-writing craving ratings were averaged at each session, and group mean scores were plotted to assess within-session change and session-to-session trends. These analyses aimed to detect any systematic increases, decreases, or volatility in craving intensity that may reflect intervention-related fluctuations in affective or motivational states.

Due to the small sample size and exploratory nature of these outcomes, no inferential statistics were applied. All analyses were descriptive, and patterns were evaluated via visual inspection of aggregate plots to identify trends warranting further investigation in future studies.

## 2.8 Ethics and Safety

This study received ethical approval from the Research Ethics Board (REB) at the IWK Health Centre (REB #1030569). All procedures were conducted in accordance with the ethical standards outlined in the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans (TCPS2, 2022), as well as institutional guidelines for research with minors and trauma-affected populations.

Participant safety was actively monitored throughout the study through multiple mechanisms. Paraprofessional coaches received specialized training on identifying potential adverse events, such as elevated distress, suicidality, or signs of psychosis. Any concerns raised during or between sessions were documented using an internal adverse event reporting form and immediately escalated to the supervising licensed clinical psychologist. The supervising psychologist was on-call 24/7 throughout the study period to respond to safety concerns and provide immediate clinical support to coaches if needed.

The supervising psychologist reviewed and triaged all reported events and, if necessary, initiated appropriate follow-up (e.g., direct contact with the participant or caregiver, safety planning, or referral to emergency services). Weekly clinical supervision meetings were held to discuss ongoing participant concerns, assess emerging risks, and ensure fidelity to safety procedures. No adverse events occurred during the study period.

All data were collected and stored using REDCap, a secure, web-based application designed for managing clinical research data. REDCap is hosted on secure institutional servers at the IWK Health Centre. To protect participant confidentiality, each participant was assigned a unique study ID number, identifiable information was stored in

a separate, encrypted file accessible only to the principal investigator, her supervisors, and designated research staff, de-identified data were used for all analyses, and role-based access controls restricted data entry and review to authorized team members only.

In line with institutional research policies, all study records will be retained for five years following study completion. After this period, electronic files will be permanently deleted using secure, REB-approved data disposal procedures. Paper records, if any, will be shredded and destroyed. These procedures ensure long-term protection of participant privacy and adherence to ethical standards in data stewardship.

## CHAPTER 3 – RESULTS

### 3.1 Participants

#### 3.1.1 Recruitment and Enrollment

A CONSORT diagram summarizing participant flow is presented in Figure 1. A total of 35 individuals completed the consent-to-contact form. Of these, 5 individuals (14.3%) were excluded prior to the information session due to being unreachable ( $n = 4$ ) or expressing no further interest in participation ( $n = 1$ ). The remaining 30 individuals (85.7%) attended the virtual information session. A parent/caregiver attended the information session along with the adolescent in 16 cases (53.3%).

Following the information session, 17 individuals (56.7%) were excluded before formal screening. This included 5 who declined to participate (16.7%) and 12 (40.0%) who self-disclosed ineligibility, citing active suicidality ( $n = 4$ ), being outside the eligible age range ( $n = 1$ ), unstable psychiatric medication ( $n = 6$ ), and other circumstances such as relocation ( $n = 1$ ).

Thirteen individuals (43.3%) proceeded to formal eligibility screening. Of these, 7 (53.8%) were deemed ineligible due to scoring below the subclinical threshold on the PCL-5 ( $PCL-5 < 31$ ;  $n = 2$ ), suicidality identified during screening ( $n = 2$ ), active psychosis symptoms ( $n = 1$ ), or unstable medication ( $n = 2$ ). This yielded an eligibility proportion of 46.2%. Among the six individuals determined to be eligible, all six consented to participate, yielding an enrollment rate of 100%. The participants were randomized to the immediate WET condition ( $n = 4$ ) or waitlist condition ( $n = 2$ ).

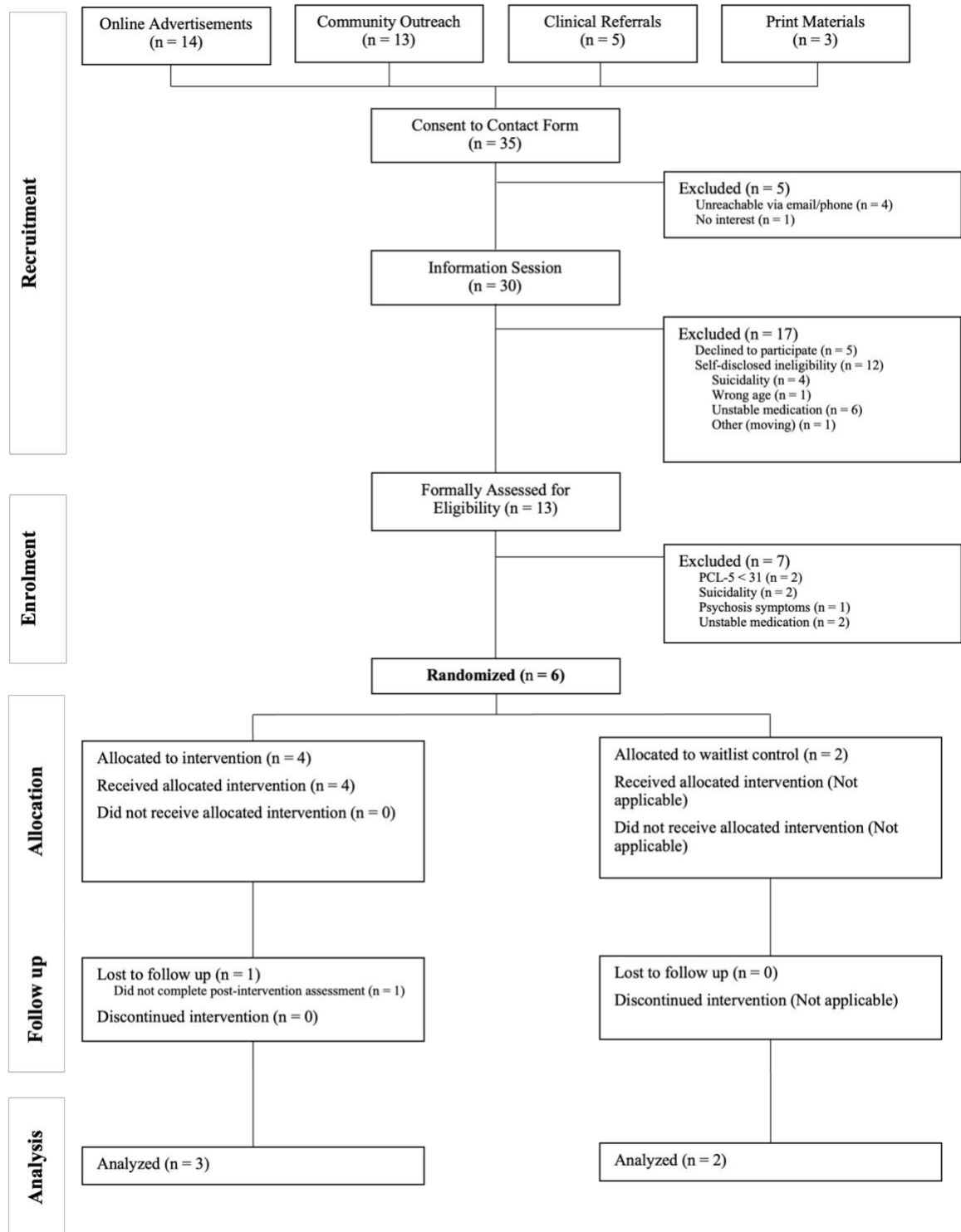
The 35 who completed the online consent-to-contact form were successfully referred from four distinct recruitment channels: online advertisements, including

Instagram, Facebook and TikTok ( $n = 14$ ; 40%), community outreach ( $n = 13$ ; 37.1%), clinical referrals ( $n = 5$ ; 14.3%), and print materials ( $n = 3$ ; 8.6%). Online advertisements and community outreach were the most successful in terms of initial engagement. Community outreach involved extensive engagement with over 250 youth-serving organizations across Canada, youth mental health centers, school-based wellness programs, family resource centers, multicultural organizations, 2SLBTQ+ youth networks, Indigenous friendship centers, youth drop-in programs, and non-profit organizations focused on mental health and trauma recovery.

Additionally, the principal investigator directly participated in a variety of community events to build trust and increase awareness of the study. These included group sessions and workshops, meetings with parent advisory committees, outreach to youth groups hosted in churches and community halls, and visits to women's shelters. These efforts were aimed at connecting with diverse communities and reaching youth who may not be engaged in formal healthcare services.

**Figure 1**

*CONSORT Diagram of Participant Flow*



Note. PCL-5 = PTSD Checklist for the DSM-5 (Weathers et al., 2013).

### 3.1.2 Sample Characteristics

Sample characteristics are presented in Table 2. Participants ranged in age from 13 to 19 years, with an overall mean age of 15.33 years ( $SD = 1.21$ ). The mean age was slightly higher in the WET group ( $M = 15.80$ ,  $SD = 1.26$ ) compared to the waitlist group ( $M = 14.50$ ,  $SD = 0.71$ ). Half of the sample (50%) was between 13-15 years old, while the remaining half was aged 16-19. Most participants identified as a female/girl ( $n = 5$ , 83.3%), and one identified as a male/boy ( $n = 1$ , 16.7%). All participants identified as White/Caucasian (100%).

The total sample reported exposure to an average of  $M = 5.50$  ( $SD = 2.21$ ) potentially traumatic events on the LEC-5. Participants in the immediate WET group reported fewer events on average ( $M = 4.75$ ,  $SD = 2.06$ ) than those in the waitlist group ( $M = 7.00$ ,  $SD = 5.66$ ). Across the full sample, the most frequently endorsed traumatic experiences included transportation accidents (66.7%), physical assault (50.0%), assault with a weapon (50.0%), and sexual assault (50.0%). Other common events (endorsed by 33.3% of participants) included exposure to natural disasters, captivity, severe human suffering, and both sudden violent and accidental deaths. Less frequently reported events included serious accidents, life-threatening illness or injury, and causing harm to others (each endorsed by 16.7% of the sample). Three participants (50.0%) reported other types of trauma, including emotional/psychological abuse, witnessing a psychotic episode, and chronic medical procedures or illness.

Index traumas selected for treatment or evaluation reflected a range of experiences. Among participants in the immediate WET group, chosen index traumas included captivity ( $n = 1$ ), transportation accident ( $n = 1$ ), sexual assault ( $n = 1$ ), and

physical assault ( $n = 1$ ). In the waitlist control group, participants selected a transportation accident ( $n = 1$ ) and severe human suffering ( $n = 1$ ) as their index traumas.

With respect to substance use history, 66.7% of participants reported lifetime alcohol use, including all participants in the waitlist group and half of those in the WET group. Similarly, 66.7% reported lifetime cannabis use, including three of four in the WET group and one of two in the waitlist group. Cannabis craving was endorsed by the same proportion (66.7%), while no participants reported a history of alcohol craving.

**Table 2**

*Sample Characteristics*

Demographic Characteristic	Immediate WET ( $n = 4$ )		Waitlist Control ( $n = 2$ )		Total ( $N = 6$ )	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<b>Age</b>						
13-15 years	1	25.00	2	100.00	3	50.00
16-19 years	3	75.00	0	0.00	3	50.00
Mean age in years ( <i>SD</i> )	15.80	(1.26)	14.50	(0.71)	15.33	(1.21)
<b>Sex/Gender</b>						
Female/girl	3	75.00	2	100.00	5	83.33
Male/boy	1	25.00	0	0.00	1	16.67
<b>Ethnicity</b>						
White/Caucasian	4	100.00	2	100.00	6	100.00
Mean number of traumatic events ( <i>SD</i> )	4.75	(2.06)	7.00	(5.66)	5.50	(2.21)
<b>LEC-5</b>						
Natural disaster	1	25.00	1	50.00	2	33.33
Fire or explosion	1	25.00	0	0.00	1	16.67
Transportation accident	3	75.00	1	50.00	4	66.67
Serious accident	0	0.00	1	50.00	1	16.67
Exposure to toxic substance	0	0.00	0	0.00	0	0.00
Physical assault	2	50.00	1	50.00	3	50.00
Assault with a weapon	2	50.00	1	50.00	3	50.00
Sexual assault	2	50.00	1	50.00	3	50.00
Other unwanted/uncomfortable sexual experience	1	25.00	0	0.00	1	16.67
Combat or exposure to war zone	0	0.00	0	0.00	0	0.00
Captivity	1	25.00	1	50.00	2	33.33

Demographic Characteristic	Immediate WET ( <i>n</i> = 4)		Waitlist Control ( <i>n</i> = 2)		Total ( <i>N</i> = 6)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
	Life-threatening illness/injury	0	0.00	1	50.00	1
Severe human suffering	1	25.00	1	50.00	2	33.33
Sudden violent death	1	25.00	1	50.00	2	33.33
Sudden accidental death	1	25.00	1	50.00	2	33.33
Serious injury, harm, death caused to someone else	0	0.00	1	50.00	1	16.67
Other	2	50.00	1	50.00	3	50.00
Emotional/psychological abuse	1	25.00	0	50.00	1	16.67
Witnessing a psychotic episode	1	25.00	0	0.00	1	16.67
Severe medical procedures/chronic illness	0	0.00	1	50.00	1	16.67
Substance Use History						
Lifetime alcohol use	2	50.00	2	100.00	4	66.67
Lifetime cannabis use	3	75.00	1	50.00	4	66.67
Substance Use Craving History						
Alcohol	0	0.00	0	0.00	0	0.00
Cannabis	3	75.00	1	50.00	4	66.67

*Note.* WET = Written Exposure Therapy; SD = Standard Deviation. Values are presented as *n* (%) unless otherwise specified. Age and number of traumatic events are reported as mean (SD). Traumatic event exposure was assessed using the Life Events Checklist for DSM-5 (LEC-5) (Gray et al., 2004). Participants could endorse multiple traumatic events across different categories. Substance use cravings reflects a history of craving for alcohol or cannabis reported at baseline.

## 3.2 Feasibility

### 3.2.1 Trial Feasibility

Among the six eligible participants who were enrolled and randomized, four were allocated to the intervention group, and two were allocated to the waitlist control group. All participants received their assigned allocation. One participant in the intervention group completed all five WET sessions but was lost to follow-up and did not complete the post-intervention assessment. The remaining five participants completed post-intervention measures, yielding a trial retention rate of 83.3%. Among these five, data completeness was 100%, with no missing responses across any time point or outcome domain.

### 3.2.2 Intervention Feasibility

Intervention feasibility was assessed through adherence, dropout rates, implementation fidelity, and writing task engagement within the immediate WET group ( $n = 4$ ). All four participants (100%) completed all five WET sessions, submitted written narratives for each session, and provided SUDS scores (and if relevant, Craving Thermometer scores) as instructed. There were no withdrawals or missed sessions in the intervention group, resulting in a dropout rate of 0%, which was below the pre-specified acceptability threshold of 25%, supporting H1.

Implementation fidelity was monitored using coach-completed session adherence checklists, which indicated that all core treatment components were delivered as intended. Coaches reported full adherence across all sessions for all participants, including provision of psychoeducation in Session 1, structured trauma narrative writing during Sessions 1-5, and feedback following each written narrative in Sessions 2-5.

One minor protocol deviation was implemented during treatment delivery. Participants commonly expressed difficulty identifying or labeling their emotions during in-session writing exercises. In response, Plutchik's Wheel of Emotions was introduced in Session 2 as a supportive tool to assist all participants with emotional identification during the writing process (Plutchik & Kellerman, 1980). The wheel visually organizes eight primary emotions (joy, trust, fear, surprise, sadness, disgust, anger, and anticipation) into a circular model that illustrates their intensity, oppositional relationships, and blended states (i.e., emotions that result from combining two primary emotions). This tool was used to help participants more precisely articulate their internal

experiences during narrative writing. This adaptation was applied consistently across all intervention participants and documented in coaching records.

Writing task engagement was also evaluated by examining word count data for each participant across sessions. Participant 1 produced the longest narratives, averaging 1,053.60 words per session ( $SD = 569.76$ ), while Participants 2, 3, and 4 averaged 684.00 ( $SD = 79.80$ ), 697.20 ( $SD = 228.23$ ), and 614.00 ( $SD = 70.58$ ) words per session, respectively. At the session level, mean word counts ranged from a high of 962.00 ( $SD = 551.99$ ) in Session 1 to a low of 606.50 ( $SD = 77.91$ ) in Session 4, with an increase to 738.75 ( $SD = 242.64$ ) in Session 5.

With respect to safety of the WET protocol, no adverse events or safety concerns were reported. Taken together, these findings indicate that telehealth- and paraprofessional coach-delivered WET was feasible and acceptable for adolescent participants in this trial.

### **3.3 Individual-Level Symptom Trajectories and Clinical Significance**

A summary of individual-level changes across all outcome measures, including RCI, MCID, and severity category shifts, is presented in Table 3 and visualized in Figure 2. Participant 1 completed all five WET sessions but did not complete post-intervention assessments and was excluded from the present symptom outcome analyses. Among the three remaining participants in the immediate WET group with complete pre- and post-intervention data (Participants 2-4), all demonstrated clinically significant improvements across multiple symptom domains.

Participant 2's PCL-5 total score decreased from 38 (clinical) at pre-treatment to 25 (not clinical) at post-treatment, a reduction of 13 points. The corresponding RCI was

-2.43, exceeding the  $\pm 1.96$  threshold for statistical reliability. The reduction also exceeded the MCID threshold of 10 points. Symptom cluster scores decreased across all domains: Cluster B (intrusion) from 9 to 5 ( $\Delta = -4$ ), Cluster C (avoidance) from 5 to 3 ( $\Delta = -2$ ), Cluster D (negative alterations in cognition/mood) from 13 to 9 ( $\Delta = -4$ ), and Cluster E (hyperarousal) from 11 to 8 ( $\Delta = -3$ ). Their GAD-7 score decreased from 12 to 7 ( $\Delta = -5$ ), with an RCI of -3.53 and a reduction exceeding the 4-point MCID. The PHQ-9 score decreased from 11 to 5 ( $\Delta = -6$ ), exceeding the 5-point MCID. However, the RCI was -1.88, below the threshold for reliable change. The SDS total score decreased from 11 to 5 ( $\Delta = -6$ ), with an RCI of -1.28. Although not statistically reliable, the change exceeded the 2-point MCID. Functional domain scores were as follows: work impairment remained unchanged at 0 ( $\Delta = 0$ ), social impairment decreased from 4 to 2 ( $\Delta = -2$ ), and family impairment decreased from 7 to 3 ( $\Delta = -4$ ).

Participant 3's PCL-5 total score decreased from 57 (clinical) at pre-treatment to 30 (not clinical) at post-treatment, a reduction of 27 points. The RCI was -5.04, exceeding the  $\pm 1.96$  threshold. The change also surpassed the MCID threshold of 10 points. Symptom cluster scores decreased across all domains: Cluster B from 14 to 6 ( $\Delta = -8$ ), Cluster C from 4 to 2 ( $\Delta = -2$ ), Cluster D from 26 to 14 ( $\Delta = -12$ ), and Cluster E from 12 to 8 ( $\Delta = -4$ ). The GAD-7 score decreased from 19 to 8 ( $\Delta = -11$ ), with an RCI of -5.55 and a reduction exceeding the 4-point MCID. The PHQ-9 score declined from 28 to 18 ( $\Delta = -10$ ), with an RCI of -3.76 and change exceeding the 5-point MCID. The SDS total score decreased from 10 to 7 ( $\Delta = -3$ ), with an RCI of -2.13 and change exceeding the 2-point MCID. Domain-specific changes in functioning included: work impairment from 8

to 7 ( $\Delta = -1$ ), social impairment remained unchanged at 3 ( $\Delta = 0$ ), and family impairment from 8 to 7 ( $\Delta = -1$ ).

Participant 4's PCL-5 total score decreased from 54 (clinical) at pre-treatment to 40 (clinical) at post-treatment, a reduction of 14 points. The RCI was -2.61, exceeding the reliability threshold, and the reduction surpassed the 10-point MCID. Cluster scores declined as follows: Cluster B from 11 to 8 ( $\Delta = -3$ ), Cluster C from 6 to 3 ( $\Delta = -3$ ), Cluster D from 17 to 11 ( $\Delta = -6$ ), and Cluster E from 20 to 18 ( $\Delta = -2$ ). The GAD-7 score decreased from 20 to 9 ( $\Delta = -11$ ), with an RCI of -3.03 and change exceeding the MCID. The PHQ-9 score decreased from 29 to 18 ( $\Delta = -11$ ), with an RCI of -3.01 and reduction exceeding the 5-point MCID. The SDS score declined from 29 to 18 ( $\Delta = -11$ ), with an RCI of -2.35 and change exceeding the MCID. Functional domain scores changed as follows: work impairment from 10 to 7 ( $\Delta = -3$ ), social impairment from 9 to 5 ( $\Delta = -4$ ), and family impairment from 10 to 6 ( $\Delta = -4$ ).

Neither waitlist participant met criteria for clinically meaningful improvement on any outcome measure with worsening in some outcomes. Participant 5's PCL-5 total score increased from 52 (clinical) to 65 (clinical), a 13-point increase. The RCI was 2.43, indicating a statistically reliable increase in PTSD symptoms. The change exceeded the MCID threshold of 10 points. PCL-5 symptom cluster scores changed as follows: Cluster B (intrusion) increased from 11 to 13 ( $\Delta = +2$ ), Cluster C (avoidance) increased from 5 to 6 ( $\Delta = +1$ ), Cluster D (negative alterations in cognition/mood) increased from 20 to 26 ( $\Delta = +6$ ), and Cluster E (hyperarousal) increased from 16 to 20 ( $\Delta = +4$ ). The GAD-7 score decreased from 21 to 19 ( $\Delta = -2$ ). The RCI was -1.01, below the  $\pm 1.96$  threshold. The reduction did not exceed the 4-point MCID. The PHQ-9 score increased from 19 to 20 ( $\Delta$

= +1). The RCI was 0.38, below the threshold for reliable change, and the increase did not exceed the 5-point MCID. The SDS total score increased from 23 to 26 ( $\Delta = +3$ ), with an RCI of 0.64. This did not exceed the threshold for statistically reliable change, nor the 2-point MCID. Functional domain changes were as follows: work impairment increased from 10 to 12 ( $\Delta = +2$ ), social impairment remained stable at 7 ( $\Delta = 0$ ), and family impairment increased from 6 to 7 ( $\Delta = +1$ ).

Participant 6's PCL-5 total score decreased from 55 (clinical) to 53 (clinical;  $\Delta = -2$ ), with an RCI of -0.37, indicating no reliable change. The reduction did not exceed the 10-point MCID. Symptom cluster scores changed as follows: Cluster B (intrusion) decreased from 13 to 12 ( $\Delta = -1$ ), Cluster C (avoidance) remained stable at 5 ( $\Delta = 0$ ), Cluster D (negative alterations in cognition/mood) decreased from 20 to 18 ( $\Delta = -2$ ), and Cluster E (hyperarousal) increased from 17 to 18 ( $\Delta = +1$ ). The GAD-7 score increased from 10 to 16 ( $\Delta = +6$ ), with an RCI of 3.03, indicating a statistically reliable increase. The change exceeded the 4-point MCID. The PHQ-9 score increased from 4 to 10 ( $\Delta = +6$ ), with an RCI of 2.26, surpassing the  $\pm 1.96$  threshold and indicating a statistically reliable increase. The change also exceeded the 5-point MCID. The SDS score decreased from 21 to 18 ( $\Delta = -3$ ), with an RCI of -0.64. This did not meet criteria for reliable or clinically meaningful change. SDS functional domain changes were as follows: work impairment decreased from 9 to 8 ( $\Delta = -1$ ), social impairment from 5 to 4 ( $\Delta = -1$ ), and family impairment from 7 to 6 ( $\Delta = -1$ ).

These results support H2a: all participants who received WET demonstrated improvement in at least one clinical domain, with multiple cases showing reliable and clinically meaningful change across multiple outcomes. H2b was also supported:

participants in the waitlist control group showed minimal or no improvement in symptoms; indeed, worsening was observed in several instances.

**Table 3***Participant-Level Changes in Clinical Outcomes*

Participant	Sex/Gender, Age	Index Trauma	Measure	Pre	Post	Δ Score	RCI	MCID
<b>Immediate WET</b>								
1	Male/boy, 16	Captivity	PCL-5	32	N/A	N/A	N/A	N/A
			Cluster B: Re-experiencing	7	N/A	N/A		
			Cluster C: Avoidance	2	N/A	N/A		
			Cluster D: Cognition/Mood	10	N/A	N/A		
			Cluster E: Arousal	13	N/A	N/A		
			PHQ-9	27	N/A	N/A	N/A	N/A
			GAD-7	0	N/A	N/A	N/A	N/A
			SDS	25	N/A	N/A	N/A	N/A
			Work/schoolwork	10	N/A	N/A		
			Social life/leisure activities	5	N/A	N/A		
			Family life/home responsibilities	10	N/A	N/A		
2	Female/girl, 16	Transportation Accident	PCL-5	38	25	-13	-2.43*	Yes
			Cluster B: Re-experiencing	9	5	-4		
			Cluster C: Avoidance	5	3	-2		
			Cluster D: Cognition/Mood	13	9	-4		
			Cluster E: Arousal	11	8	-3		
			PHQ-9	12	7	-5	-1.88	Yes
			GAD-7	12	5	-7	-3.53*	Yes
			SDS	11	5	-6	-1.28	Yes
			Work/schoolwork	4	2	-2		
			Social life/leisure activities	7	3	-4		
			Family life/home responsibilities	0	0	0		
3	Female/girl, 17	Sexual Assault	PCL-5	57	30	-27	-5.04*	Yes
			Cluster B: Re-experiencing	14	6	-8		
			Cluster C: Avoidance	4	2	-2		
			Cluster D: Cognition/Mood	26	14	-12		
			Cluster E: Arousal	12	8	-4		
			PHQ-9	21	11	-10	-3.76*	Yes

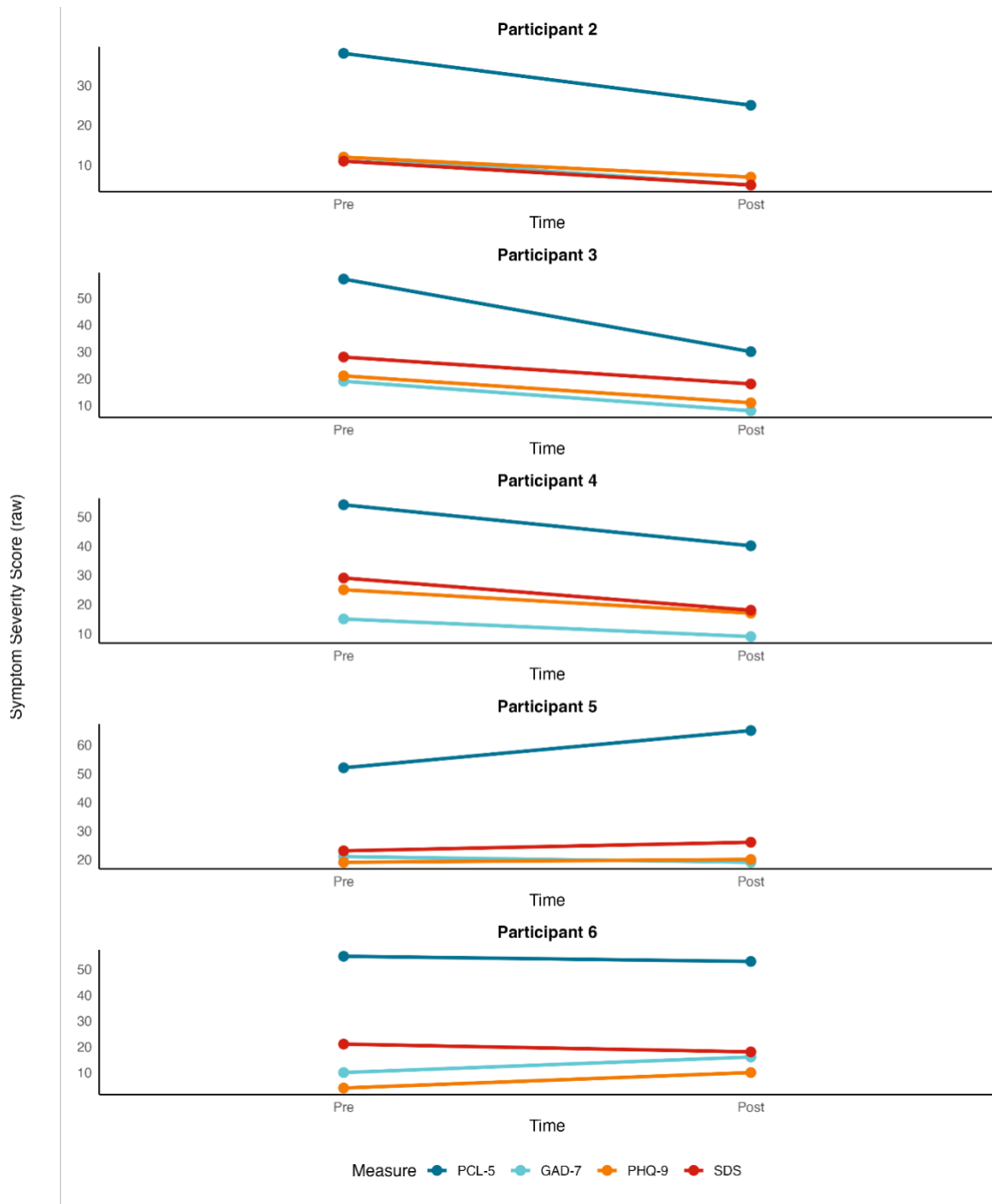
Participant	Sex/Gender, Age	Index Trauma	Measure	Pre	Post	$\Delta$ Score	RCI	MCID
			GAD-7	19	8	-11	-5.55*	Yes
			SDS	28	18	-10	-2.13*	Yes
			Work/schoolwork	10	7	-3		
			Social life/leisure activities	8	3	-5		
			Family life/home responsibilities	10	8	-2		
4	Female/girl, 14	Physical Assault	PCL-5	54	40	-14	-2.61*	Yes
			Cluster B: Re-experiencing	11	8	-3		
			Cluster C: Avoidance	6	3	-3		
			Cluster D: Cognition/Mood	17	11	-6		
			Cluster E: Arousal	20	18	-2		
			PHQ-9	25	17	-8	-3.01*	Yes
			GAD-7	15	9	-6	2.02*	Yes
			SDS	29	18	-11	-2.35*	Yes
			Work/schoolwork	10	7	-3		
			Social life/leisure activities	9	5	-4		
			Family life/home responsibilities	10	6	-4		
69	<b>Waitlist Control</b>							
5	Female/girl, 15	Transportation accident	PCL-5	52	65	13	2.43*	No
			Cluster B: Re-experiencing	17	15	-2		
			Cluster C: Avoidance	3	7	4		
			Cluster D: Cognition/Mood	20	22	2		
			Cluster E: Arousal	12	21	9		
			PHQ-9	19	20	1	0.38	No
			GAD-7	21	19	-2	-1.01	No
			SDS	23	26	3	0.64	No
			Work/schoolwork	6	10	4		
			Social life/leisure activities	7	8	1		
			Family life/home responsibilities	10	8	-2		
6	Female/girl, 14	Severe human suffering	PCL-5	55	53	-2	-0.37	No
			Cluster B: Re-experiencing	15	16	1		
			Cluster C: Avoidance	6	5	-1		
			Cluster D: Cognition/Mood	18	16	-2		
			Cluster E: Arousal	16	16	0		

Participant	Sex/Gender, Age	Index Trauma	Measure	Pre	Post	$\Delta$ Score	RCI	MCID
			PHQ-9	4	10	6	2.26*	No
			GAD-7	10	16	6	3.03*	No
			SDS	21	18	-3	-0.64	No
			Work/schoolwork	7	7	0		
			Social life/leisure activities	6	4	-2		
			Family life/home responsibilities	8	7	-1		

*Note.* RCI = Reliable Change Index (negative values indicate symptom improvement whereas positive values indicate symptom worsening); MCID = Minimal Clinically Important Difference; PCL-5 = PTSD Checklist for the DSM-5 (Weathers et al., 2013); PHQ-9 = Patient Health Questionnaire 9 (Kroenke et al., 2001); GAD-7 = Generalized Anxiety Disorder 7 (Spitzer et al., 2006); SDS = Sheehan Disability Scale (Sheehan & Sheehan, 2008); N/A = Data not available; \* = Significant RCI.

**Figure 2**

*Individual Symptom Trajectories*



*Note.* PCL-5 = PTSD Checklist for the DSM-5 (Weathers et al., 2013); PHQ-9 = Patient Health Questionnaire 9 (Kroenke et al., 2001); GAD-7 = Generalized Anxiety Disorder 7 (Spitzer et al., 2006); SDS = Sheehan Disability Scale (Sheehan & Sheehan, 2008). Symptom trajectories for individual participants ( $n = 3$ ) in the intervention condition with complete pre- and post-treatment data are displayed.

### 3.4 Between-Group Symptom Change Comparisons

The third objective was to examine changes in PTSD symptoms, depression, anxiety, and functional impairment by comparing pre- to post-intervention scores between participants assigned to the immediate WET group and those in the waitlist control group. Group-level means for each outcome measure at baseline and post-intervention are presented in Table 4, and symptom trajectories are illustrated in Figure 3.

Participants in the immediate WET condition ( $n = 3$ ) showed a reduction in PCL-5 total scores from a pre- intervention mean of 49.67 ( $SD = 10.21$ ) to a post- intervention mean of 31.67 ( $SD = 7.64$ ), whereas participants in the waitlist condition ( $n = 2$ ) showed an increase from 53.50 ( $SD = 2.12$ ) to 59.00 ( $SD = 8.49$ ). The between-group difference at post- intervention reflected a large effect size,  $g = -2.49$ , 95% CI [-4.75, -0.17]. Visual inspection of Figure 3 shows that the error bars for post- intervention PCL-5 scores in the immediate WET and waitlist groups do not overlap, indicating that the observed difference between groups is substantial and unlikely to be due to random variation.

Examination of symptom clusters showed the largest between-group difference for Cluster B (re-experiencing), with a post- intervention mean of 6.33 ( $SD = 1.53$ ) in the immediate WET group compared to 15.50 ( $SD = 0.71$ ) in the waitlist group,  $g = -5.05$ , 95% CI [-9.10, -1.08]. For Cluster C (avoidance), the immediate WET group mean decreased to 2.67 ( $SD = 0.58$ ), whereas the waitlist group increased to 6.00 ( $SD = 1.41$ ),  $g = -2.56$ , 95% CI [-4.85, -0.19]. Cluster D (negative alterations in cognition and mood) decreased to 11.33 ( $SD = 2.52$ ) in the immediate WET group and remained stable at 19.00 ( $SD = 4.24$ ) in the waitlist group,  $g = -1.74$ , 95% CI [-3.53, 0.17]. Cluster E (hyperarousal) scores declined to 11.33 ( $SD = 5.77$ ) in the immediate WET group and

increased to 18.50 ( $SD = 3.54$ ) in the waitlist group,  $g = -1.01$ , 95% CI [-2.46, 0.55]. All effect sizes were large ( $g > .8$ ) for the four PTSD symptom domain scores.

GAD-7 scores decreased in the immediate WET group from 15.33 ( $SD = 3.51$ ) to 7.33 ( $SD = 2.08$ ), while scores in the waitlist group increased from 15.50 ( $SD = 7.78$ ) to 17.50 ( $SD = 2.12$ ). The between-group effect size at post- intervention was large,  $g = -3.51$ , 95% CI [-6.45, -0.56]. Visual inspection of the GAD-7 panel in Figure 3 reveals clear separation in post-intervention scores and non-overlapping error bars between groups.

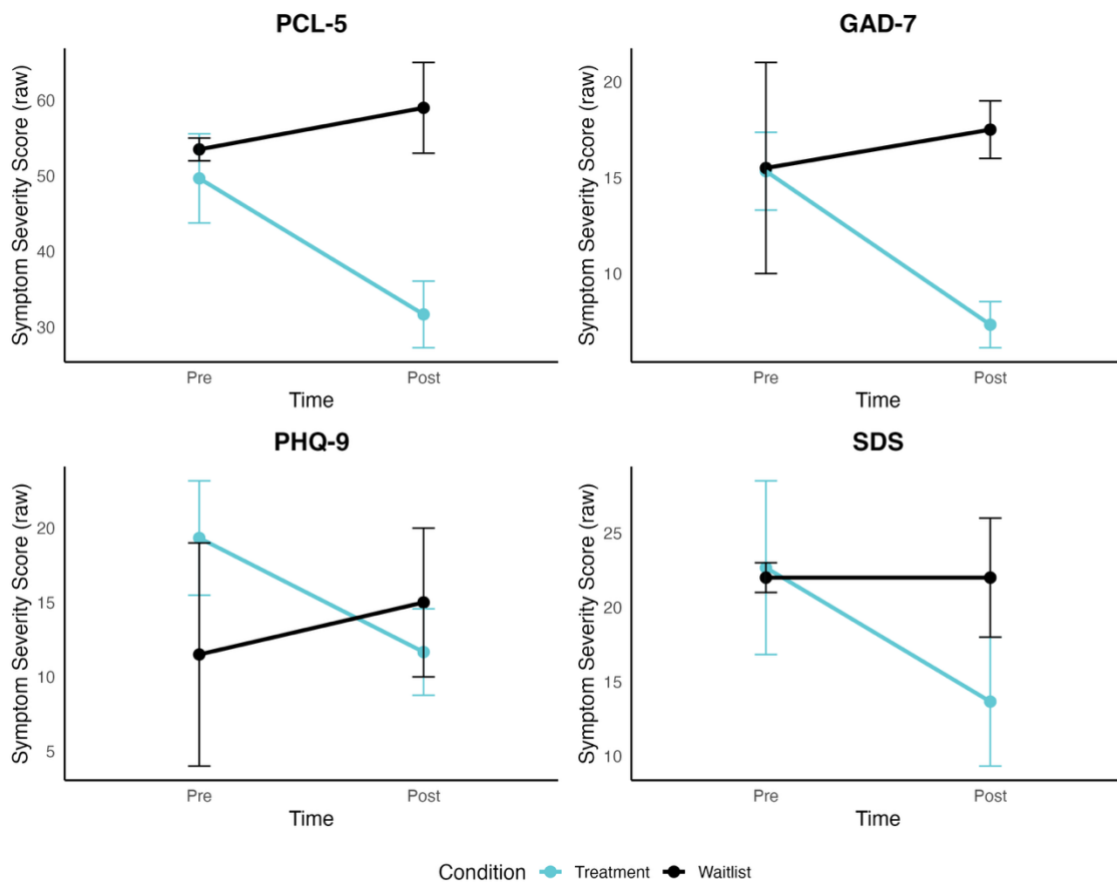
PHQ-9 scores decreased in the immediate WET group from 19.33 ( $SD = 6.66$ ) to 11.67 ( $SD = 5.03$ ), whereas they increased in the waitlist group from 11.50 ( $SD = 10.61$ ) to 15.00 ( $SD = 7.07$ ). The between-group post- intervention effect was small to moderate,  $g = -0.42$ , 95% CI [-1.72, 0.95]. In contrast to PCL-5 and GAD-7, error bars for PHQ-9 post- intervention means appear to overlap across conditions in Figure 3, suggesting greater within-group variability and more modest group separation.

SDS total scores decreased in the immediate WET group from 22.67 ( $SD = 10.12$ ) to 13.67 ( $SD = 7.51$ ), while scores in the waitlist group remained stable at 22.00 (pre-treatment  $SD = 1.41$ ; post-treatment  $SD = 5.66$ ). The between-group post- intervention effect was large,  $g = -0.87$ , 95% CI [-2.27, 0.64]. Visual inspection of Figure 3, supported by calculated standard errors (Immediate WET  $SE = 4.33$ ; Waitlist Control  $SE = 4.00$ ), indicates that the post-intervention error bars for SDS do overlap. This overlap reflects greater within-group variability and less precision in between-group comparisons for functional impairment relative to the PTSD and anxiety measures. Within SDS domains, work/school impairment scores declined in the immediate WET group from 8.00 ( $SD =$

3.46) to 5.33 ( $SD = 2.89$ ) and increased in the waitlist group from 6.50 ( $SD = 0.71$ ) to 8.50 ( $SD = 2.12$ ), resulting in a large effect size of  $g = -0.86$ , 95% CI [-2.26, 0.64]. Social life impairment decreased in the immediate WET group from 8.00 ( $SD = 1.00$ ) to 3.67 ( $SD = 1.15$ ), while remaining relatively stable in the waitlist group (6.50 [ $SD = 0.71$ ] to 6.00 [ $SD = 2.83$ ]); this yielded a large effect size of  $g = -0.90$ , 95% CI [-2.31, 0.62]. Family life impairment scores declined in the immediate WET group from 6.67 ( $SD = 5.77$ ) to 4.67 ( $SD = 4.16$ ), compared to a decrease from 9.00 ( $SD = 1.41$ ) to 7.50 ( $SD = 0.71$ ) in the waitlist group, with a moderate effect size of  $g = -0.60$ , 95% CI [-1.93, 0.82].

**Figure 3**

*Group Symptom Trajectories by Outcome*



*Note.* PCL-5 = Posttraumatic Stress Disorder Checklist for DSM-5 (Weathers et al., 2013); PHQ-9 = Patient Health Questionnaire-9 (Kroenke et al., 2001); GAD-7 = Generalized Anxiety Disorder 7-item scale (Spitzer et al., 2006); SDS = Sheehan Disability Scale (Sheehan & Sheehan, 2008). This figure displays mean symptom severity scores in the Immediate Written Exposure Therapy (WET) group and the Waitlist Control group from pre- to post-treatment. Error bars represent  $\pm 1$  standard error of the mean.

**Table 4***Between-Group Changes in Clinical Outcomes*

Outcome Measure	Immediate WET ( <i>n</i> = 3)				Waitlist Control ( <i>n</i> = 2)				Hedges' <i>g</i>	95% CI
	Pre		Post		Pre		Post			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
PCL-5 (Total)	49.67	10.21	31.67	7.64	53.50	2.12	59.00	8.49	-2.49	[-4.75, -0.17]
Cluster B: Re-experiencing	11.33	2.52	6.33	1.53	16.00	1.41	15.50	0.71	-5.05	[-9.10, -1.08]
Cluster C: Avoidance	5.00	1.00	2.67	0.58	4.50	2.12	6.00	1.41	-2.56	[-4.85, -0.19]
Cluster D: Cognition/Mood	18.67	6.66	11.33	2.52	19.00	1.41	19.00	4.24	-1.74	[-3.53, 0.17]
Cluster E: Arousal	14.33	4.93	11.33	5.77	14.00	2.83	18.50	3.54	-1.01	[-2.46, 0.55]
GAD-7	15.30	3.51	10.67	7.37	15.50	7.78	17.50	2.12	-3.51	[-6.45, -0.56]
PHQ-9	19.33	6.66	11.67	5.03	11.50	10.61	15.00	7.07	-0.42	[-1.72, 0.95]
SDS (Total)	22.67	10.12	13.67	7.51	22.00	1.41	22.00	5.66	-0.87	[-2.27, 0.64]
Work/schoolwork	8.00	3.46	5.33	2.89	6.50	0.71	8.50	2.12	-0.86	[-2.26, 0.64]
Social life/leisure activities	8.00	1.00	3.67	1.15	6.50	0.71	6.00	2.83	-0.90	[-2.31, 0.62]
Family life/home responsibilities	6.67	5.77	4.67	4.16	9.00	1.41	7.50	0.71	-0.60	[-1.93, 0.82]

*Note.* WET = Written Exposure Therapy; CI = Confidence Interval; PCL-5 = PTSD Checklist for the DSM-5 (Weathers et al., 2013); PHQ-9 = Patient Health Questionnaire 9 (Kroenke et al., 2001); GAD-7 = Generalized Anxiety Disorder 7 (Spitzer et al., 2006); SDS = Sheehan Disability Scale (Sheehan & Sheehan, 2008).

### 3.5 Sensitivity Analysis

To evaluate the robustness of treatment effects, a sensitivity analysis was conducted in which the missing post-intervention data for one participant in the immediate WET group were imputed using a conservative baseline observation carried forward approach (Mallinckrodt et al., 2008). Group means, standard deviations, and Hedges'  $g$  effect sizes with 95% confidence intervals were recalculated for all clinical outcomes, incorporating the imputed data (see Appendix A).

In the sensitivity analysis, the immediate WET group ( $n = 4$ ) showed a reduction in PCL-5 total scores from a pre-intervention mean of 45.25 ( $SD = 12.15$ ) to a post-intervention mean of 31.75 ( $SD = 6.24$ ), whereas the waitlist control group ( $n = 2$ ) exhibited an increase from 53.50 ( $SD = 2.12$ ) to 59.00 ( $SD = 8.49$ ). The between-group effect remained large,  $g = -3.17$ , 95% CI [-5.63, -0.62], consistent with the original large effect ( $g = -2.49$ ).

PCL-5 Cluster B (re-experiencing) decreased in the WET group from 10.25 ( $SD = 2.99$ ) to 6.50 ( $SD = 1.29$ ) and in the waitlist group from 16.00 ( $SD = 1.41$ ) to 15.50 ( $SD = 0.71$ ), yielding a large effect,  $g = -6.12$ , 95% CI [-10.41, -1.86], which was slightly larger than the original estimate ( $g = -5.05$ ). Cluster C (avoidance) showed a reduction in the WET group from 4.25 ( $SD = 1.71$ ) to 2.50 ( $SD = 0.58$ ), and the waitlist group increased from 4.50 ( $SD = 2.12$ ) to 6.00 ( $SD = 1.41$ ), producing a large effect,  $g = -3.23$ , 95% CI [-5.72, -0.65], consistent with the original large effect ( $g = -2.56$ ).

Cluster D (cognition/mood) scores declined from 16.50 ( $SD = 6.95$ ) to 11.00 ( $SD = 2.16$ ), while the waitlist group remained at 19.00 ( $SD = 1.41$  pre;  $SD = 4.24$  post), producing a large effect,  $g = -2.26$ , 95% CI [-4.23, 0.18]. This effect remained consistent

with the original large effect (original  $g = -1.74$ ). Cluster E (arousal) scores in the WET group declined from 14.00 ( $SD = 4.08$ ) to 11.75 ( $SD = 4.79$ ), and the waitlist group increased from 14.00 ( $SD = 2.83$ ) to 18.50 ( $SD = 3.54$ ), yielding a large effect,  $g = -1.20$ , 95% CI [-2.72, 0.43], consistent with the original large effect ( $g = -1.01$ ).

On the GAD-7, the WET group showed a decrease from 11.50 ( $SD = 8.19$ ) to 5.50 ( $SD = 4.04$ ), while the waitlist group increased from 15.50 ( $SD = 7.78$ ) to 17.50 ( $SD = 2.12$ ), resulting in a large effect,  $g = -2.62$ , 95% CI [-4.78, -0.36], consistent with the original large effect ( $g = -3.51$ ).

For depressive symptoms (PHQ-9), the WET group declined from 21.25 ( $SD = 6.65$ ) to 15.50 ( $SD = 8.70$ ), and the waitlist group increased from 11.50 ( $SD = 10.61$ ) to 15.00 ( $SD = 7.07$ ), yielding a negligible effect,  $g = -0.05$ , 95% CI [-1.31, 1.40], attenuated from the original small-to-moderate effect ( $g = -0.42$ ).

On the SDS total score, the WET group improved from 23.25 ( $SD = 8.34$ ) to 16.50 ( $SD = 8.35$ ), whereas the waitlist group remained at 22.00 ( $SD = 1.41$  pre;  $SD = 5.66$  post), yielding a moderate effect,  $g = -0.57$ , 95% CI [-1.94, 0.87], attenuated from the original large effect ( $g = -0.87$ ).

In SDS subdomains, work/school impairment decreased in the WET group from 8.50 ( $SD = 3.00$ ) to 5.50 ( $SD = 3.32$ ), and increased in the waitlist group from 6.50 ( $SD = 0.71$ ) to 8.50 ( $SD = 2.12$ ), yielding a moderate effect,  $g = -0.52$ , 95% CI [-1.89, 0.91], attenuated from the original large effect ( $g = -0.86$ ). Social functioning improved in the WET group from 7.25 ( $SD = 1.71$ ) to 4.00 ( $SD = 1.15$ ), and the waitlist group changed from 6.50 ( $SD = 0.71$ ) to 6.00 ( $SD = 2.83$ ), resulting in a large effect,  $g = -0.92$ , 95% CI [-2.36, 0.61], consistent with the original large effect ( $g = -0.90$ ).

Family life impairment scores declined in the WET group from 7.50 ( $SD = 5.00$ ) to 6.00 ( $SD = 4.32$ ), and from 9.00 ( $SD = 1.41$ ) to 7.50 ( $SD = 0.71$ ) in the waitlist group, producing a small effect,  $g = -0.32$ , 95% CI [-1.67, 1.07], attenuated from the original moderate effect ( $g = -0.60$ ).

### **3.6 Session-by-Session Changes in Distress and Craving**

SUDS scores were recorded immediately before and after each of the five writing exercises for each participant in the immediate WET group ( $n = 4$ ). As shown in Figure 4, individual patterns of distress generally revealed decreases from pre- to post-writing across sessions, though the magnitude and trajectory of reduction varied by participant.

Participant 1 began treatment with a relatively low initial distress level, reporting a pre-writing SUDS of 7 and a post-writing score of 5 during Session 1. SUDS ratings decreased further over the course of treatment, with pre-writing scores dropping to 3, 2, 1, and 0 in Sessions 2 through 5, respectively. Post-writing SUDS scores similarly declined to 1, 1, 0, and 0. By Session 5, both pre- and post-writing SUDS scores had reached 0, indicating no reported distress.

Participant 2 reported higher initial levels of distress, beginning with a pre-writing SUDS score of 80 and a post-writing score of 77 during Session 1. Across sessions, pre-writing scores declined steadily (75, 60, 30, 10), and post-writing scores also decreased (60, 50, 20, 3), reaching a low of 3 post-session by Session 5.

Participant 3 also reported high initial distress, with pre-writing SUDS scores of 85, 85, 75, 60, and 20 across Sessions 1 through 5. Post-writing scores declined consistently after each session (80, 60, 50, 30, 5), suggesting a session-by-session reduction in distress following expressive writing.

Participant 4 entered treatment with a moderate initial SUDS level of 40, which decreased to 20 post-writing in Session 1. This pattern of moderate pre-session distress followed by lower post-session scores persisted across subsequent sessions, with pre-writing SUDS declining from 15 in Session 2 to 4 in Session 5. Post-writing SUDS scores followed a similar pattern, decreasing from 13 to 0 across the same interval.

At the group level, mean pre-writing SUDS scores decreased from 53.00 ( $SD = 36.69$ ) in Session 1 to 8.50 ( $SD = 8.70$ ) in Session 5. Mean post-writing scores declined from 45.50 ( $SD = 38.61$ ) to 2.00 ( $SD = 2.45$ ), indicating consistent within- and across-session reductions in subjective distress. These aggregate patterns are displayed in Figure 5 and detailed in Table 5.

Cannabis craving ratings were collected immediately after each SUDS score from the three participants in the immediate WET group who reported both a history of cannabis use and cravings at baseline. Individual trajectories of craving are also presented in Figure 4. Participant 1 began WET with low craving levels, reporting a pre-writing score of 1 and a post-writing score of 1 in Session 1. Across subsequent sessions, pre-writing craving fluctuated slightly (0, 3, 1, 0), while post-writing scores were consistently low (1, 0, 0, 0). By Sessions 4 and 5, both pre- and post-writing craving scores were 0, indicating an absence of reported craving.

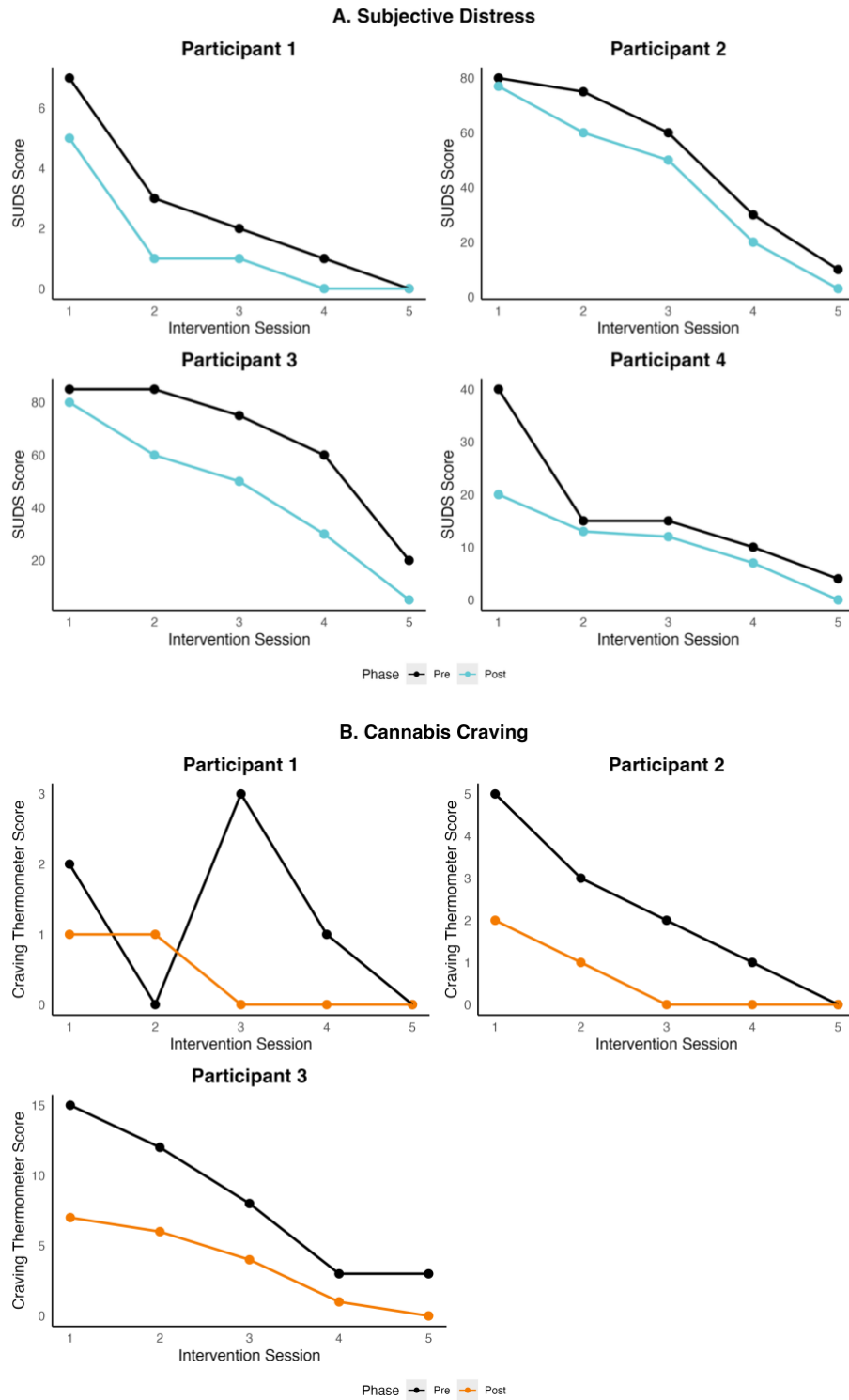
Participant 2 also began with relatively low craving, reporting a pre-writing score of 5 and a post-writing score of 2 in Session 1. Pre-session craving decreased steadily across sessions (3, 2, 1, 0), with corresponding post-session scores dropping to 1, 0, 0, and 0. These data reflect a consistent downward trajectory in both baseline and post-writing craving over time, with complete resolution by Session 5.

Participant 3 reported the highest initial craving, beginning with a pre-writing score of 15 and a post-writing score of 7 in Session 1. Over time, pre-writing craving declined steadily (12, 8, 3, 3), while post-writing scores showed a consistent reduction (6, 4, 1, 0). By Session 5, Participant 3 reported a post-writing craving of 0, marking a substantial reduction from baseline.

Group-level analysis indicated a decrease in mean pre-writing craving from 7.33 ( $SD = 6.81$ ) in Session 1 to 1.00 ( $SD = 1.73$ ) by Session 5. Post-writing craving scores showed a similarly decreasing trend, declining from 3.33 ( $SD = 3.21$ ) to 0.00 ( $SD = 0.00$ ) across sessions. These trends are visualized in Figure 5 and summarized in Table 5.

**Figure 4**

*Individual Changes in Subjective Distress and Cannabis Craving*

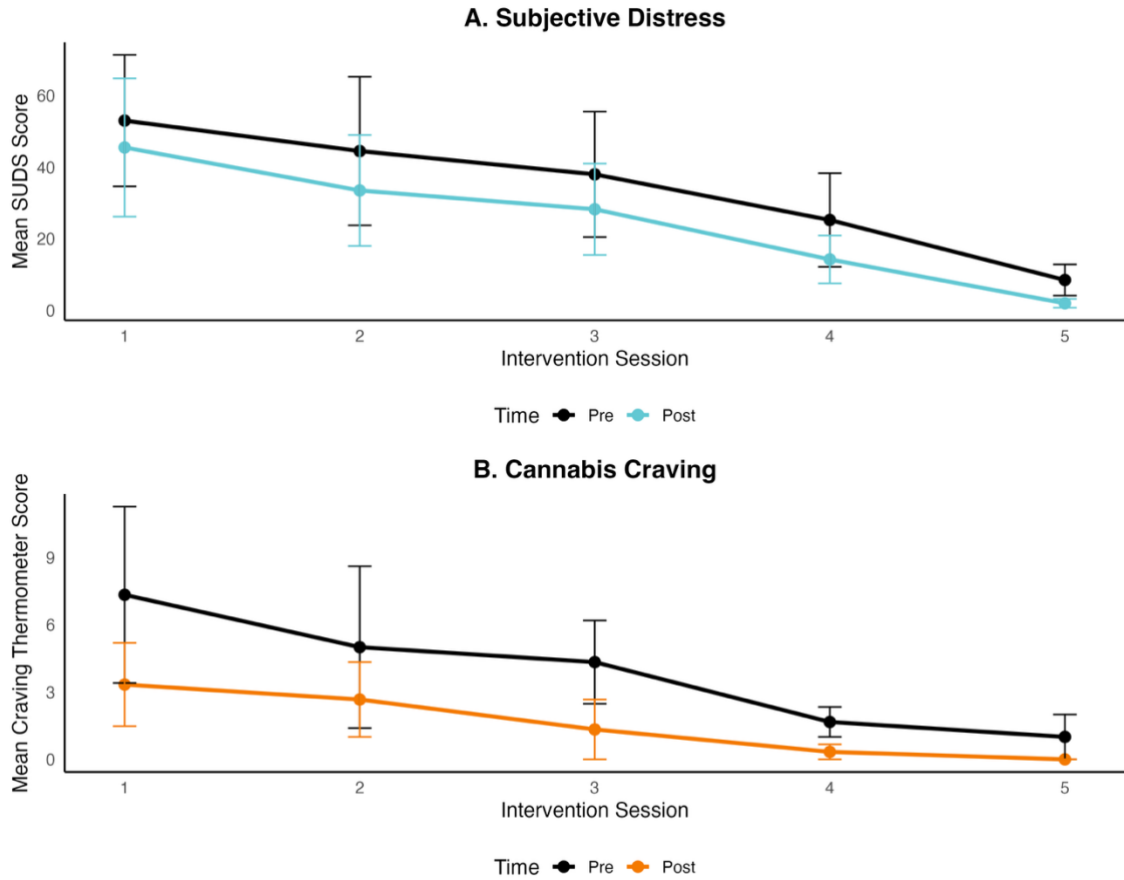


*Note.* SUDS = Subjective Units of Distress Scale (Wolpe, 2018). Cannabis craving was measured using the Craving Thermometer (Back et al., 2015). Scores reflect pre- and post-writing ratings collected during each

telehealth-delivered, paraprofessional-facilitated Written Exposure Therapy (WET) session. Craving data are shown for three participants; one did not report any a history of cannabis use or cannabis craving.

**Figure 5**

*Aggregate Changes in Subjective Distress and Cannabis Craving*



*Note.* SUDS = Subjective Units of Distress Scale (Wolpe, 2018); Cannabis craving was assessed using a visual analog scale (Craving Thermometer) (Back et al., 2015). Values represent mean scores reported before (Pre) and after (Post) each of five WET sessions. Error bars reflect  $\pm 1$  standard error of the mean.

**Table 5***Average Distress and Cannabis Craving Scores by Session*

Measure	Session	Time	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
SUDS	1	Pre	53.00	36.74	7.00	85.00
		Post	45.50	38.58	5.00	80.00
	2	Pre	44.50	41.52	3.00	85.00
		Post	33.50	31.03	1.00	60.00
	3	Pre	38.00	34.97	2.00	75.00
		Post	28.25	25.46	1.00	50.00
	4	Pre	25.25	26.22	1.00	60.00
		Post	14.25	13.43	0.00	30.00
	5	Pre	8.50	8.66	0.00	20.00
		Post	2.00	2.45	0.00	5.00
Craving Thermometer	1	Pre	7.33	6.81	2.00	15.00
		Post	3.33	3.21	1.00	7.00
	2	Pre	5.00	6.24	0.00	12.00
		Post	2.67	2.89	1.00	6.00
	3	Pre	4.33	3.21	2.00	8.00
		Post	1.33	2.31	0.00	4.00
	4	Pre	1.67	1.15	1.00	3.00
		Post	0.33	0.58	0.00	1.00
	5	Pre	1.00	1.73	0.00	3.00
		Post	0.00	0.00	0.00	0.00

*Note.* SUDS = Subjective Units of Distress Scale (Wolpe, 2018); Craving Thermometer = self-reported 0-100 scale of cannabis craving (Back et al., 2015). Scores reflect ratings collected immediately before and after each writing exercise during telehealth-delivered, paraprofessional coach-facilitated Written Exposure Therapy (WET). Participants in the immediate WET group ( $n = 4$ ) completed all five sessions; cannabis craving data were available for three of these participants because one participant in the immediate WET group did not report any a history of cannabis use or cannabis craving.

## CHAPTER 4 – DISCUSSION

### 4.1 Trial and Intervention Feasibility

This trial demonstrated several encouraging indicators of feasibility for implementing WET with teens experiencing PTSD symptoms, while also identifying important considerations for future adaptations and trial design.

#### 4.1.1 Recruitment, Enrollment, and Barriers to Participation

Recruitment yielded an average of seven interested individuals per month, a notable rate given the longstanding challenges associated with engaging adolescents with PTSD in clinical research (Hoffmann et al., 2022; Vogel et al., 2020). Of the 35 adolescents who completed the consent-to-contact form, 30 (85.7%) attended the information session, and 13 (43.3%) proceeded to formal eligibility screening. The eligibility proportion among those screened was 46.2%, and all six eligible participants enrolled and were randomized, yielding an enrollment rate of 100% among eligible individuals.

These findings reflect strong procedural retention among eligible individuals once they entered the screening process, but high attrition across earlier recruitment stages. More than half of individuals who dropped out prior to screening (12/17; 70.6%) self-disclosed ineligibility due to suicidality, unstable medication, or trauma-unrelated distress—all of which are appropriate for exclusion in early-phase trials but may also reflect the limitations of narrowly defined clinical eligibility criteria. To improve efficiency and reduce participant burden, future trials might consider reordering early procedures by administering a brief pre-screening survey prior to the information session and consent process. This may reduce participant burden and prevent avoidable attrition

by identifying ineligible individuals earlier in the recruitment pipeline, thereby increasing the efficiency of outreach and engagement efforts.

A meaningful subset of interested individuals ( $n = 5$ ) declined to proceed due to feeling unready to confront their trauma despite reporting likely meeting eligibility criteria. This reluctance may reflect avoidance, a core symptom of PTSD. In fact, avoidance of trauma reminders is not only diagnostic but also a well-documented barrier to treatment engagement among adolescents with PTSD (Gutermann et al., 2016; Oruche et al., 2014). To address this, future trials may benefit from incorporating a brief motivational enhancement component. For example, Dr. Henny Westra's work has demonstrated the value of motivational interviewing as a prelude to anxiety treatment to reduce avoidance and enhance treatment readiness for an intervention involving exposure (Westra, 2012). A similar motivational interviewing-based approach could be adapted to prepare trauma-exposed youth for WET, especially in early-stage interventions.

#### **4.1.2 Engagement of Families and Recruitment Strategies**

Family context may also influence treatment initiation and adherence. In this study, over half of interested adolescents (53.3%) had a parent or guardian attend the initial information session, and of the six enrolled, four (66.7%) were accompanied by a parent/caregiver at the information session. This aligns with existing literature showing that caregiver involvement can facilitate adolescent treatment engagement (Loos et al., 2020). Though WET is designed as an individual intervention, future trials may wish to explore how structured caregiver support, whether in the form of preparatory discussions, psychoeducation, or parallel support sessions, affects uptake, adherence, and outcomes in adolescent populations. One model worth exploring is Community Reinforcement and

Family Training (CRAFT), which trains concerned significant others in behavioral strategies to support treatment entry (Archer et al., 2019). Originally developed for substance use treatment, CRAFT has shown success with adolescent populations (Waldron et al., 2007), and may be adaptable for youth with PTSD.

Recruitment strategies varied in effectiveness. Online advertisements accounted for the largest share of referrals (40.0%), followed closely by community outreach (37.1%). However, the utility of digital outreach was constrained by evolving platform policies. In 2022–2023, Meta (parent company of Instagram and Facebook) restricted ad targeting based on age and mental health–related content. As a result, many of our online ads reached users that fell outside the eligible age range or did not meet PTSD-related criteria. These limitations suggest that while digital advertising proved useful for raising broad awareness of the study, it was not sufficient as a standalone recruitment strategy.

In contrast, community outreach proved more effective in directly reaching eligible youth. This strategy involved proactive and sustained engagement with over 250 youth-serving organizations across Canada, including mental health clinics, school wellness teams, and culturally tailored programs such as Indigenous friendship centers and 2SLGBTQ+ youth networks. The principal investigator’s participation in community events (both virtual and in-person) likely helped build trust and credibility, which are critical drivers of recruitment success among marginalized youth populations (Brockman et al., 2023). Despite the high time investment, these results highlight the value of community-integrated recruitment. Embedding trials in existing service systems (e.g., school-based clinics or pediatric practices) may further reduce stigma and logistical barriers to participation (Brockman et al., 2023; Mendelson et al., 2021).

### **4.1.3 Retention, Adherence, Fidelity & Writing Engagement**

Trial retention among enrolled participants was high. Five of the six randomized adolescents (83.3%) completed post-intervention assessments. The sole non-completer, who was also the only participant identifying as male/boy, attended all five WET sessions, suggesting that attrition at follow-up was more likely due to practical barriers (e.g., scheduling conflicts) rather than dissatisfaction with the intervention itself. Notably, participants were not offered monetary compensation for follow-up, which may have affected motivation to complete final assessments. Among those who completed follow-up, data completeness was 100%, indicating that the survey burden was acceptable and feasible for teens.

All four participants randomized to the immediate WET condition completed all five treatment sessions, submitted written trauma narratives at each session, and provided pre- and post-writing distress ratings (SUDS), with three (all eligible to do so) also reporting cannabis craving ratings using the Craving Thermometer. This resulted in a 0% dropout rate in the intervention group, well below the pre-specified acceptability threshold of 25%. This finding supports H1 and is consistent with previous adult WET studies, which have repeatedly demonstrated lower dropout rates compared to other gold-standard PTSD treatments. For example, dropout in WET has ranged from 6% to 24% across civilian and military samples, whereas rates for CPT and PE have often exceeded 35% in the same trials (Sloan et al., 2018, 2022). The current study extends this pattern to teenagers and suggests that perhaps the same features of WET that improve retention among adults (e.g., brief format, absence of homework, and use of written rather than verbal exposure) may also enhance tolerability and adherence for younger populations.

Furthermore, treatment fidelity was high. Session adherence checklists completed by paraprofessional coaches indicated that all core components of the WET protocol were delivered as intended. However, one minor protocol adjustment was implemented in response to participant needs. Several adolescents expressed difficulty identifying and labeling their emotions during the first session of the trauma writing process, which aligns with research showing that adolescents are still developing the emotional vocabulary and self-awareness needed to describe internal experiences (Cohen et al., 2013). To support participants, Plutchik's Wheel of Emotions was introduced in Session 2 for all participants to help them identify specific feelings during writing (Plutchik & Kellerman, 1980). Participants anecdotally reported that the tool was helpful, and coaches anecdotally noted greater emotional engagement during subsequent sessions. This modification may represent a developmentally appropriate adjustment that could be formally incorporated into adolescent versions of WET, and could be studied experimentally to determine whether it enhances the efficacy of the exposure component and overall treatment outcomes.

Engagement with the trauma writing task was also evaluated descriptively using session-level word count as a proxy indicator. Participants demonstrated strong and consistent engagement across sessions. All four participants submitted complete written narratives for each of the five sessions, with average word counts per participant ranging from 614 to 1,054 words (*SD* range = 70.6-569.8), suggesting meaningful variation in expressive output but overall sustained involvement. Session-level word counts ranged from a mean of 962 words in Session 1 to 606.5 words in Session 4, with a general trend toward shorter narratives across time. This pattern may reflect emotional habituation,

improved efficiency in recounting trauma experiences, or increasing narrative focus as treatment progressed. Regardless of interpretation, these results support the feasibility of the writing task itself and suggest that teens can engage with structured trauma writing.

Finally, no adverse events were reported, and all participants were able to submit their narratives via secure email without technical issues, further supporting the practicality of telehealth and paraprofessional delivery models. Taken together, the combined indicators of high session attendance, full treatment adherence, complete narrative submission, and writing task engagement provide robust preliminary support for the feasibility and acceptability of telehealth-delivered WET in teen populations.

## **4.2 Preliminary Effectiveness**

### **4.2.1 Individual Symptom Trajectories**

Analysis of individual symptom trajectories revealed clinically meaningful improvements among all participants in the immediate WET group, consistent with hypotheses H2a and H2b. Each of the three treated adolescents with post-intervention data demonstrated reductions on the PCL-5 that exceeded both the RCI and MCID, while waitlist participants showed either symptom stability or deterioration in PTSD symptoms. These improvements in the WET group align with theoretical models of PTSD recovery (e.g., Foa & Kozak, 1986), which propose that repeated, structured engagement with trauma memories promotes emotional processing, habituation, and cognitive restructuring.

Participant 2, whose total PCL-5 score declined from the clinical to the subclinical range, showed significant reductions across all PTSD symptom clusters, in addition to improvements in anxiety, depression, and functional impairment. While the

change in PHQ-9 did not meet the threshold for reliable change ( $RCI = -1.88$ ), it exceeded the MCID of 5 points, suggesting that the improvement was still clinically meaningful. These findings mirror outcomes from adult RCTs, where large PTSD symptom severity reductions have been documented following WET (e.g., Sloan et al., 2018; Wisco et al., 2015), and parallel adolescent case series of WET such as Yun and Lee's (2022) study.

Participant 3 demonstrated the largest treatment response, with a 27-point reduction on the PCL-5 and large concurrent decreases in anxiety ( $\Delta = -11$ ), depression ( $\Delta = -10$ ), and functional impairment ( $\Delta = -10$ ). This pattern suggests that WET may have transdiagnostic benefits, aligning with prior evidence that the intervention leads to significant reductions in depressive symptoms (Nilini et al., 2023; Stoycos et al., 2023; Thompson-Hollands et al., 2018), decreases in anxiety (Stoycos et al., 2023), and improvements in overall functioning (LoSavio et al., 2023).

Participant 4, while not transitioning to subclinical status on the PCL-5, still exhibited a 14-point decrease in total score, along with reliable and clinically significant reductions in depression ( $\Delta = -11$ ), anxiety ( $\Delta = -11$ ), and functional impairment ( $\Delta = -11$ ). Taken together, these findings demonstrate that even in cases of persistent PTSD symptoms, meaningful functional and emotional gains are achievable within a short course of WET.

Conversely, symptom trajectories among waitlist participants suggest that, in the absence of treatment, PTSD-related and broader psychological symptoms may remain stable or even worsen, consistent with hypothesis H2b. Participant 5 demonstrated a reliable and clinically significant worsening of PTSD symptoms, with a 13-point increase

on the PCL-5 (RCI = 2.43), alongside increased functional impairment. This deterioration likely reflects the effects of sustained avoidance and unresolved trauma-related intrusions—key mechanisms identified in theoretical models of PTSD maintenance when exposure-based processing is absent (Foa & Kozak, 1986).

Participant 6, in contrast, exhibited reliable worsening of anxiety (GAD-7  $\Delta = +6$ ) and depression (PHQ-9  $\Delta = +7$ ), while PTSD symptoms remained relatively unchanged (PCL-5  $\Delta = +1$ ). One possible contributor to this pattern is the timing of the post-assessment, which occurred at the end of the academic school year—a period often associated with heightened academic stress. Such contextual demands may exacerbate internalizing symptoms in adolescents, independent of trauma-specific processes (Stromájer et al., 2023), highlighting the importance of attending to comorbid risks when supporting trauma-exposed youth.

#### **4.2.2 Group-Level Comparisons**

Between-group comparisons revealed clear and consistent patterns favoring the immediate WET condition across most symptom domains. While the small sample size precluded inferential testing, effect size estimates and visual inspection of means and confidence intervals provide preliminary evidence that WET, when delivered via telehealth and by paraprofessional coaches, may produce clinically meaningful reductions in PTSD symptoms, anxiety, depression, and functional impairment among teenagers.

The most pronounced treatment effect emerged for PTSD symptom severity as measured by the PCL-5. Participants in the immediate WET group demonstrated a 36% reduction in mean PCL-5 total scores from a baseline mean of 49.67 to a post-treatment mean of 31.67 (a decrease of 18 points). This magnitude of reduction is consistent with

prior literature. For instance, case studies of WET for suicide (WET-S) in a psychiatric inpatient unit also showed substantial PCL-5 decreases in some patients, such as Patient A reducing from 56 to 11, Patient B from 57 to 22, and Patient D from 53 to 32 (Tyler et al., 2022). In contrast, participants in our waitlist condition experienced a 10% increase in symptom severity, moving from 53.50 to 59.00. The between-group difference at post-treatment reflected a large effect size,  $g = -2.49$ , with non-overlapping confidence intervals suggesting that symptom reductions in the immediate WET group were substantial and unlikely due to random variability. This finding is highly consistent with existing adult WET trials, where RCTs that included a waitlist comparison condition have observed large between-condition effect sizes, ranging from  $d = 1.05$ - $4.11$  (DeJesus et al., 2024; Sloan & Marx, 2024). The present study extends these positive findings to a younger population.

Analysis of PCL-5 symptom clusters in the present study suggests that WET may be particularly effective in reducing re-experiencing (Cluster B) and avoidance (Cluster C) symptoms. The strongest between-group effect was observed for re-experiencing ( $g = -5.05$ ), with non-overlapping confidence intervals and clear separation at post-treatment. Avoidance symptoms also showed a robust effect ( $g = -2.56$ ), indicating meaningful therapeutic impact. Effects for negative alterations in cognition and mood (Cluster D;  $g = -1.74$ ) and hyperarousal (Cluster E;  $g = -1.01$ ) were smaller and more variable but remained large sized effects, in favor of WET. These findings partially align with those of Ahmadi et al. (2022), who assessed symptom clusters among Afghan adolescent girls undergoing m-WET. Their modified WET (m-WET) intervention produced significant reductions in intrusion and arousal symptoms, paralleling the large effects observed here

for Clusters B and E. However, Ahmadi et al. (2022) reported no significant effect on avoidance, diverging from our findings of a large between-group effect for Cluster C. This discrepancy may reflect differences in sample characteristics, intervention format (group-based m-WET vs. individual WET; without vs. with a coach), and/or measurement tools. Altogether, the present results indicate that standard WET may provide a broad spectrum of symptom relief for adolescents, with particularly strong effects on core PTSD mechanisms such as re-experiencing and avoidance.

Anxiety symptoms, as measured by the GAD-7, decreased sharply in the WET group ( $\Delta = -8.00$ ), with a large between-group effect size ( $g = -3.51$ ). This change was accompanied by minimal improvement in the waitlist group and suggests that WET may exert transdiagnostic effects on generalized anxiety symptoms. These findings are consistent with adult trials showing that WET improves generalized anxiety symptoms, particularly among individuals with high baseline arousal and worry (Sloan et al., 2018; Stoycos et al., 2023). The observed anxiety reductions may stem from several mechanisms. First, repeated trauma writing likely reduced avoidance and hyperarousal, which are key drivers of both PTSD and generalized anxiety (Pennebaker, 1997). Second, writing may have fostered emotion regulation through exposure, increased clarity about trauma-related emotions, and a sense of mastery over distressing experiences, thereby reducing anxiety (Sloan & Marx, 2019). Third, the absence of homework and the private, structured nature of WET may have reduced treatment-related anxiety itself, particularly for adolescents who perceive traditional therapy as overwhelming or stigmatizing (Bunnell et al., 2021; Roberts et al., 2022). Taken together, these results suggest that

WET's benefits may extend beyond PTSD-specific symptomatology and support its utility in addressing co-occurring anxiety symptoms.

Depressive symptoms (PHQ-9) also improved in the WET group ( $\Delta = -7.66$ ), while waitlist participants showed worsening ( $\Delta = +3.50$ ). However, the between-group effect size was small to moderate ( $g = -0.42$ ), and confidence intervals crossed zero, suggesting greater within-group variability. Notably, there was variability in pre-treatment depression scores, which may limit the generalizability of this outcome and suggest that observed effects on depression may not apply uniformly across participants. Nevertheless, these results align with previous WET studies showing that reductions in PTSD symptoms are often accompanied by improvements in depression (DeJesus et al., 2024; Marx et al., 2022). One possible explanation is that WET may target shared underlying mechanisms of PTSD and depression, such as maladaptive trauma-related beliefs, social withdrawal, and emotional numbing, which can contribute to both symptom profiles. This complements Pennebaker's inhibition theory (1997), which holds that chronic suppression of trauma-related thoughts and feelings contributes to depressive symptomatology. Although effects on depression were less robust than those observed for PTSD and anxiety, the pattern suggests that WET may offer secondary benefits for mood-related symptoms.

Functional impairment (SDS) improved in the WET group across all domains (work/school, social, and family life), yielding a large overall effect size ( $g = -0.87$ ). The largest improvements emerged in school/work and social life functioning. These domains are among the most commonly disrupted in adolescent PTSD due to trauma-related avoidance, hyperarousal, and cognitive interference (Pat-Horenczyk et al., 2007; McLean

et al., 2013). Large reductions in school-related impairment ( $g = -0.86$ ) suggest that WET may restore adolescents' ability to concentrate, attend, and regulate behavior in academic settings—factors predictive of positive long-term outcomes such as higher rates of secondary school completion, increased postsecondary enrollment, and reduced risk of becoming disengaged from education, employment, or training in late adolescence (Polimanti et al., 2019; Jaffee et al., 2013). Similarly, large effects on social functioning ( $g = -0.90$ ) reflect improvements in peer engagement, which are critical for developmental resilience and social-emotional growth (Wang et al., 2024; Almeida et al., 2021).

In contrast, improvements in family life impairment were moderate in magnitude ( $g = -0.60$ ), consistent with literature indicating that familial functioning may require more targeted systemic or relational interventions (Favre et al., 2024). This pattern highlights an important opportunity for innovation in adolescent PTSD treatment: augmenting individual protocols like WET with developmentally sensitive relational components. One promising direction involves adapting existing dyadic models to adolescent populations. For example, Cognitive Behavioral Conjoint Therapy for PTSD (CBCT) (Monson & Feldman, 2012), is an evidence-based approach designed to reduce PTSD symptoms while improving intimate relationship functioning. A recent RCT comparing CBCT to PE among military populations found that CBCT demonstrated significantly lower dropout rates compared to PE (27% vs. 65%) and led to consistent relational improvements, particularly among participants with lower baseline relationship functioning (Monson et al., 2024). Nonetheless, our findings highlight that even without a formal relational component, WET produced meaningful improvements across multiple

domains of adolescent functioning. These observed gains underscore WET's potential to interrupt the cascading effects of PTSD on key developmental trajectories, including educational attainment, peer connection, and family integration (Kilpatrick et al., 2003; Lewis et al., 2019). While some overlap in confidence intervals indicates imprecision, the consistent direction and magnitude of effects across functional impairment domains support the feasibility and potential utility of WET for improving real-world functioning.

Sensitivity analyses further reinforced the robustness of these preliminary findings. When missing post-intervention data for one WET participant were imputed under a conservative assumption of no improvement, the overall pattern of results remained largely unchanged. Large effects for PTSD symptom severity (PCL-5 total,  $g = -3.17$ ) and anxiety symptoms (GAD-7,  $g = -2.62$ ) persisted, closely matching those observed in the primary analysis ( $g = -2.49$  and  $g = -3.51$ , respectively). Similarly, the large effects for re-experiencing (Cluster B) and avoidance (Cluster C) symptoms remained stable, with effect sizes increasing slightly under the conservative model. While depressive symptoms (PHQ-9) and functional impairment (SDS total) showed reduced effects, shifting from moderate and large ( $g = -0.42$  and  $-0.87$ , respectively) to negligible ( $g = -0.05$ ) and moderate ( $g = -0.57$ ), respectively, the direction of change remained consistent. These findings suggest that the primary symptom improvements observed for PTSD and anxiety, and associated improvements in functioning, were not driven by attrition or missing data, and our treatment effects were robust to worst-case assumptions. However, effects on negative mood may be more sensitive to missingness, warranting cautious interpretation and future replication with larger samples. Taken together, these

findings suggest that WET may be an effective and scalable intervention for reducing PTSD symptoms and related impairments in teenagers.

### **4.3 Exploratory Patterns of Subjective Distress and Cannabis Craving**

To inform future research, we conducted an exploratory analysis of subjective distress and cannabis craving during WET. Although no a priori hypotheses were formulated, session-level patterns were examined descriptively to evaluate participants' responses to repeated trauma-focused writing.

Subjective distress ratings, collected immediately before and after each writing exercise, declined both within and across the five-session protocol. While initial levels varied widely, all participants reported reduced post-writing distress over time, with most reaching minimal or no distress by Session 5. These patterns suggest that participants tolerated repeated trauma engagement and exhibited progressively diminished emotional reactivity across sessions. From a clinical perspective, these findings are important because exposure-based therapies are often underutilized with youth due to provider concerns about re-traumatization or emotional harm (Farrell et al., 2016). The consistent declines in distress observed here suggest that WET may not only be tolerable for teenagers but may also foster a sense of safety and mastery over time.

These findings are consistent with EPT (Foa & Kozak, 1986), which holds that effective exposure involves activating the fear structure and providing corrective learning through repeated, non-avoidant engagement. The initial SUDS values in our sample suggest that most participants experienced sufficient fear activation, a prerequisite for therapeutic modification according to EPT. Importantly, the two participants who reported the highest pre-writing distress (SUDS = 80 and 85) also exhibited the largest

reductions in PTSD symptoms over the course of WET. Although we did not formally test mediation given our small sample and case series design, this pattern aligns with prior findings indicating that higher initial fear activation may predict greater symptom reduction during exposure therapy (Bluett et al., 2014; Hoeboer et al., 2021).

We also conducted an exploratory analysis of cannabis craving among participants with a history of cannabis use and baseline craving ( $n = 3$ ). Results indicated a consistent downward trajectory in craving both within and across sessions. All three participants showed reductions in craving from pre- to post-writing at nearly every session, and by the final session, all reported post-writing craving scores of zero. These findings suggest that engagement in repeated trauma-focused writing may be associated with decreased craving over time. This pattern is particularly notable in light of prior research demonstrating short-term increases in craving following trauma cue exposure. For example, DeGrace et al. (2025) found that a single session of expressive writing about a traumatic event acutely elevated cannabis craving, especially expectancy-based craving (i.e., the belief that cannabis would help reduce distress). Our findings extend this work by showing that craving responses may evolve differently when trauma writing is delivered repeatedly and within a structured therapeutic framework.

Although we did not assess candidate mechanisms such as distress tolerance, negative affect, or coping expectancies, one possibility is that repeated exposure to trauma narratives reduced the salience or affective charge of trauma-related cues, thereby diminishing their capacity to trigger craving. Alternatively, structured writing may have altered participants' beliefs about the utility of cannabis as a coping strategy. However, without direct measures of these mediators, such interpretations remain speculative.

Overall, these preliminary findings point to the potential of trauma-focused writing to reduce craving over time in youth with trauma and cannabis use histories. Moreover, these data provide preliminary data to dispel concerns that writing about trauma might inadvertently lead to elevations in craving that might trigger post-session substance use.

#### **4.4 Limitations**

This feasibility trial had several methodological limitations. First, the small sample size ( $N = 6$ ) limited statistical power and precluded inferential testing. While some effect size estimates were moderate to large, wide confidence intervals in several cases reflect uncertainty around the magnitude and reliability of observed effects.

Second, outcomes were assessed exclusively via self-report, without clinician-administered diagnostic interviews. This limits diagnostic accuracy and the ability to confirm PTSD diagnostic status. Additionally, fidelity to the WET protocol was assessed only by the treatment provider, without independent rating or audio review, which increases the risk of reporting bias.

Third, while one participant identified as male/boy, he was also the only participant in the immediate WET group who did not complete post-intervention assessments. As a result, all post-treatment data were derived exclusively from participants who identified as female/girl. This limits generalizability, particularly given sex- and gender-based differences in trauma exposure, symptom expression, and help-seeking behavior (Alisic et al., 2014; Copeland et al., 2007; Gutermann et al., 2016).

Fourth, our assessment of subjective distress during exposure writing was limited to pre- and post-writing SUDS ratings. We did not capture peak SUDS levels during the writing period, which restricts our ability to evaluate emotional engagement, arousal

patterns, or habituation during the main therapeutic task, which are key mechanisms proposed to underlie the efficacy of exposure-based therapies (Foa & Kozak, 1986). Future studies may benefit from incorporating continuous or momentary distress ratings during the writing exercise, or supplementing self-report with unobtrusive physiological measures such as heart rate or skin conductance. These methods could offer a more nuanced understanding of participants' affective engagement without interrupting the writing task.

Fifth, our assessment of substance use craving was limited in scope and interpretive power. Craving was only assessed among participants who endorsed both prior lifetime use and prior experience of subjective craving for alcohol or cannabis at baseline. While this approach minimized participant burden and aligned with our focus on tolerability rather than diagnostic severity, it precludes deeper insight into the clinical relevance of observed craving changes. We did not assess participant's frequency or quantity of substance use, type and range of substances used or craved beyond alcohol and cannabis, or contextual factors influencing craving (e.g., trauma-related vs. social or environmental cues). As a result, it is unclear whether changes in craving ratings reflected clinically meaningful shifts in trauma-related substance motivation, nonspecific fluctuations, or external influences unrelated to the intervention. Future studies should consider incorporating more comprehensive substance use assessments, including structured diagnostic interviews, contextual craving measures, and behavioral indicators of use, to better characterize the nature and implications of substance-related risk in trauma-exposed youth.

Finally, ethnocultural diversity was limited. Despite targeted outreach to culturally specific youth organizations, all participants identified as White/Caucasian. This constrains applicability to racialized and Indigenous youth, who often face both higher trauma exposure and more structural barriers to accessing care (Gone et al., 2019; Sevillano et al., 2022). Future trials should strengthen community engagement and adapt protocols to ensure cultural safety and relevance.

#### **4.5 Future Directions**

This feasibility trial offers several insights that can inform the design and implementation of future studies examining WET for adolescents with PTSD. A key next step is a fully powered RCT to evaluate the clinical efficacy of WET in this population. Such a trial should incorporate clinician-administered diagnostic interviews, longer-term follow-up assessments, and multi-informant reporting, such as parent- or caregiver-reported outcomes, to improve validity and capture changes across settings. Larger sample sizes would also enable the use of inferential statistics to estimate between-group differences, model treatment trajectories, and examine moderators and mediators of clinical response. This would allow researchers to not only test whether WET is effective, but to understand for whom, under what conditions, and why.

Improving the demographic diversity of enrolled samples will also be essential to strengthening the generalizability and equity of WET research. In this trial, we encountered difficulty recruiting sex/gender-diverse and racially/ethnically minoritized adolescents. Future studies should prioritize community-engaged and culturally responsive recruitment strategies. Co-developing materials with youth, caregivers, and cultural brokers, and embedding outreach within school-based health centers, pediatric

clinics, or community organizations may increase accessibility and relevance (Brockman et al., 2023; McGovern et al., 2025; Mendelson et al., 2021). A demographically diverse sample would also allow for stratified analyses to test whether treatment effects vary by identity, trauma type, or sociocultural context.

From an intervention development perspective, this study raises questions about how the WET protocol might be developmentally optimized for adolescents. Several participants appeared to benefit from the inclusion of emotion identification supports, suggesting that structured affect-labeling tools may facilitate engagement with trauma narratives in younger populations. Future iterations of WET could formally incorporate such scaffolding.

Given that many adolescents are embedded within family systems and our finding that improvements in family life impairment were moderate in magnitude, future research should also empirically examine how WET can be adapted to address adolescents' interpersonal relationships. As mentioned earlier, one promising direction involves integrating core components of CBCT, such as enhancing trauma-related communication, restructuring shared maladaptive beliefs, and fostering supportive interactions. These elements could be tailored for adolescent-caregiver dyads and embedded within WET protocols to target relational functioning more directly. Additionally, offering structured caregiver support, whether in the form of preparatory discussions, psychoeducation, or parallel support sessions, may further enhance engagement, adherence, and treatment outcomes. Such relational adaptations may hold particular promise for improving both individual and family-level functioning in adolescents with PTSD and warrant systematic investigation in future trials.

Reductions in cannabis craving observed during the intervention also suggest that WET may yield secondary benefits in substance-related outcomes. Given the developmental links between trauma exposure and substance use, future studies should continue to assess cannabis, but also a broader range of substances. Craving for nicotine and vaping products, in particular, may be important to examine, as these substances are widely used among adolescents and associated with emotional dysregulation and increased risk of cannabis initiation (Huey & Granitto, 2020), but also with concerning impairments in lung function (Overbeek et al., 2021).

Finally, mechanistic studies are needed to clarify how WET exerts its therapeutic effects in adolescents. Linguistic analysis of trauma narratives may be particularly promising, as changes in language use, such as increased causal or insight-related words, have been linked to treatment response in expressive writing and exposure-based therapies (Pennebaker et al., 2011; Sloan et al., 2015). Additionally, assessing characteristics of trauma memory, such as fragmentation, sensory vividness, and perceived threat, may provide insight into cognitive mechanisms of change, as research suggests these features are linked to PTSD severity and treatment response (Kangaslampi & Peltonen, 2022).

An additional consideration for future research is the role of treatment setting in shaping exposure efficacy. All sessions in this trial were conducted remotely, with adolescents choosing to participate from their homes via telehealth. While this mode of delivery was feasible, it may very well be that the comfort and familiarity of the home environment may attenuate the activation of the fear memory network during trauma processing. EPT posits that sufficient activation of the fear structure is necessary for new

learning to occur (Foa & Kozak, 1986). If home-based exposure reduces this activation, it could theoretically dampen the potency of exposure-based mechanisms. Although we did not directly assess this hypothesis, comparing fear activation levels and treatment outcomes across settings (e.g., home vs. clinic) using subjective distress ratings and physiological markers could help determine whether certain environments better support therapeutic engagement and emotional processing in adolescents. Together, these methodologies could advance our understanding of WET's active ingredients and inform adaptations to enhance its effectiveness for diverse adolescent trauma presentations.

#### **4.6 Conclusion**

This case series feasibility trial is the first known study to examine the delivery of standard WET to teenagers with post-traumatic stress symptoms via telehealth and with paraprofessional support. The findings demonstrate strong preliminary indicators of feasibility, including high treatment adherence, full session completion, no treatment dropouts, and positive participant engagement. These results suggest that WET is both acceptable and tolerable for teens, even when delivered remotely and by paraprofessional coaches. Exploratory analyses of symptom outcomes indicate potential for clinical benefit of WET across multiple domains, including PTSD symptoms, depression, anxiety, functional impairment, subjective distress, and cannabis craving. While these findings are preliminary, they lay critical groundwork for future research.

Importantly, this study highlights the role that paraprofessional providers can play in expanding access to trauma-focused care. With adequate training, supervision, and protocol fidelity monitoring, paraprofessional coaches were able to deliver WET in a safe, structured, and supportive manner. This finding aligns with a growing body of

literature supporting task-shifting approaches in mental health care and suggests that integrating non-specialist providers may be a sustainable and cost-effective strategy to increase system capacity, particularly in under-resourced settings (Olthuis et al., 2023; Winiarski et al., 2019; Xiong et al., 2019). The use of telehealth also proved feasible and well-tolerated, reinforcing its potential to reduce logistical barriers, increase privacy, and expand service reach, especially for teens who may not otherwise access traditional clinic-based care.

As the field continues to seek scalable, accessible, and developmentally appropriate interventions for teen PTSD, WET presents a promising foundation. With thoughtful adaptation, rigorous evaluation, and inclusive implementation, future research holds exciting potential to advance WET as a meaningful tool in addressing the complex needs of trauma-exposed youth.

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## APPENDIX A

**Table 6**

*Sensitivity Analysis*

Outcome Measure	Immediate WET ( <i>n</i> = 4)				Waitlist Control ( <i>n</i> = 2)				Hedges' <i>g</i>	95% CI
	Pre		Post		Pre		Post			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
PCL-5 (Total)	45.25	12.15	31.75	6.24	53.50	2.12	59.00	8.49	-3.17	[-5.63, -0.62]
Cluster B: Re-experiencing	10.25	2.99	6.50	1.29	16.00	1.41	15.50	0.71	-6.12	[-10.41, -1.86]
Cluster C: Avoidance	4.25	1.71	2.50	0.58	4.50	2.12	6.00	1.41	-3.23	[-5.72, -0.65]
Cluster D: Cognition/Mood	16.50	6.95	11.00	2.16	19.00	1.41	19.00	4.24	-2.26	[-4.23, 0.18]
Cluster E: Arousal	14.00	4.08	11.75	4.79	14.00	2.83	18.50	3.54	-1.20	[-2.72, 0.43]
GAD-7	11.50	8.19	5.50	4.04	15.50	7.78	17.50	2.12	-2.62	[-4.78, -0.36]
PHQ-9	21.25	6.65	15.50	8.70	11.50	10.61	15.00	7.07	-0.05	[-1.31, 1.40]
SDS (Total)	23.25	8.34	16.50	8.35	22.00	1.41	22.00	5.66	-0.57	[-1.94, 0.87]
Work/schoolwork	8.50	3.00	5.50	3.32	6.50	0.71	8.50	2.12	-0.52	[-1.89, 0.91]
Social life/leisure activities	7.25	1.71	4.00	1.15	6.50	0.71	6.00	2.83	-0.92	[-2.36, 0.61]
Family life/home responsibilities	7.50	5.00	6.00	4.32	9.00	1.41	7.50	0.71	-0.32	[-1.67, 1.07]

*Note.* WET = Written Exposure Therapy; CI = Confidence Interval; PCL-5 = PTSD Checklist for the DSM-5 (Weathers et al., 2013); PHQ-9 = Patient Health Questionnaire 9 (Kroenke et al., 2001); GAD-7 = Generalized Anxiety Disorder 7 (Spitzer et al., 2006); SDS = Sheehan Disability Scale (Sheehan & Sheehan, 2008).