Improving Child and Adolescent Mental Health Services: A Qualitative and Quantitative Exploration into the Current State of Services in Alberta, Canada

by

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ABSTRACT

Background

There is a paucity of evidence-based research aimed at determining best-practice treatment in the context of child and adolescent mental health services (CAMHS). Despite the high prevalence of mental illness in youth, no gold-standard for treatment currently exists. Assessment tools are necessary to monitor treatment outcomes but are often overlooked. The overarching aim of this dissertation is to investigate ways in which CAMHS can be improved, with a specific focus on the use of outcome measures.

Objectives

The objectives of this work are to explore stakeholder perceptions of treatment success in a child and adolescent psychiatric inpatient unit; to investigate the impact of early-life trauma on mental illness and treatment outcomes, and to implement the use of standardized outcome measures in a youth treatment program.

Methods

A qualitative analysis of focus groups was conducted to determine stakeholder perceptions of treatment success in a youth psychiatric inpatient unit. Caregivers of children and adolescents undergoing treatment, as well as the service providers of the unit, were interviewed (Chapter 2). Subsequently, a regression analysis of the reported number of Adverse Childhood Experiences (ACEs) in youth child sexual abuse (CSA) survivors and their biological caregivers was conducted (Chapter 3). This was followed up with a longitudinal study of changes in cognitive performance for CSA survivors aged 8-12 (Chapter 4). The longitudinal analysis approach was extended to a study of changes in mental health and well-being for adolescent female CSA survivors (Chapter 5a). Based off these preliminary results, a longitudinal study of changes in mental health and well-being was extended to the first half of the program in both the children and adolescent CSA survivors; changes for pre-COVID and COVID-era cohorts were compared (Chapter 5b).

Results

Five primary themes emerged as relevant determinants of treatment success: (1) youth mental health and well-being; (2) caregiver mental health and well-being; (3) the health of the caregiver-child dyad; (4) education, socialization, & occupation; (5) institutional interactions. A moderate correlation was found between parent and child ACE scores (r[90] = 0.44, $p < 0.0001$). Over the course of treatment, statistically significant improvements in mean cognitive scores occurred for executive function (13.8%, $p<0.001$), attention (13.5%, $p=0.009$), working memory (7.3%, $p=0.02$), as well as the overall cognitive score (9.1%, $p=0.005$). In the child program, significant improvement in round one pre-COVID cohorts was reported for PTSD (-26.0%, $p=0.036$), depression (-36.6%, $p=0.05$), and anxiety (-26.2%, $p=0.001$). In the adolescent program, significant improvement in round one pre-COVID cohorts was reported in all domains: PTSD (-31.3%, $p=0.005$), depression (-21.4%, $p=0.03$), anxiety (-31.3%, $p=0.007$)), and self-esteem (20.0%, $p=0.005$). Pre-COVID cohorts generally reported larger improvements than COVID-era cohorts.

Discussion/Conclusion

This dissertation provides new knowledge in the field of child and adolescent mental health treatment and services. This is the first study to qualitatively investigate stakeholder perceptions of treatment success in a Canadian youth psychiatric inpatient unit. These interviews provided unique insights into the determinants of inpatient treatment outcomes. Stakeholders supported the implementation of regular outcome assessment as a means to evaluate treatment success in this context.

Following this analysis, a novel treatment program specifically designed for youth survivors of CSA was evaluated. These studies provide examples of routine outcome collection as a method of assessing a novel residential child and adolescent mental health treatment program. The findings of this dissertation provide preliminary evidence that the intensive and multimodal design is effective and appropriate for this population and warrants further investigation with larger samples. The unexpected onset of the COVID-19 pandemic provided a unique opportunity to assess the pandemic's impact on a vulnerable population. The results appeared to indicate that the pandemic induced treatment resistance in participants undergoing treatment, but further investigation is needed. Considering the well-established impact early-life trauma has on the onset and severity of mental illness, treatment approaches directed at specific experiences, such as CSA, may be more appropriate and effective for young people than those directed at treating symptoms or a specific diagnosis. Further investigation into best-practice approaches in CAMHS is needed.

PREFACE

The research contained in this thesis includes data collected from two different child and adolescent treatment centers: (1) The Glenrose Rehabilitation Hospital (GRH) child and adolescent psychiatric inpatient unit; (2) The Little Warriors Be Brave Ranch (BBR), a residential treatment facility specifically designed for child sexual abuse survivors. Child and adolescent mental health services is an area needing research; however, because of the difficulties associated with the mental health of youth and their families, it is considered a highly sensitive field—this is particularly true where there is early-life trauma. Unlike many areas of clinical medicine, engaging with children and adolescents in mental health has significant limitations related to access to participants and the use of specific research methodologies such as randomized-controlled trials. In my experience, over the journey that has given rise to this dissertation, I've been fortunate to work with individual researchers who had access to vulnerable populations and close associations with health organizations including Alberta Health Services (AHS) and not-for-profit organizations like Little Warriors. In this context, I've capitalized on the opportunity to use existing measurements and gather data related to stakeholder engagement. As such, this dissertation is engages a naturalistic approach with the utilization of convenience samples. It was not possible in the current environment in Alberta, and with the resources available to me, to initiate any formal clinical trial or health implementation project. Consequently, the thesis comprises two main approaches: (1) assessment in the context of inpatient hospital care (GRH); (2) evaluation of clinical data available from program evaluation that has been developing at the BBR residential treatment center over the past five years. In this context I've been able to achieve the following, as outlined in this preface.

Chapter 2

All authors made significant intellectual contributions to this manuscript. MR and MJ developed the research methods and study design with expert input from AG. Focus group interviews were conducted by MR and MJ. Transcription of interviews was completed independently by MR and MJ, and thematic analysis of the findings achieved collaboratively. AG gave final recommendations on the qualitative findings and manuscript composition.

Chapter 3

Research questions, study design, and manuscript construction was primarily the work of MR and HP with significant intellectual input from PS, WP, and AG. Data were collected by MR and analyzed statistically by MR and HP. VA, YW, GH, and LS provided consultation and expertise. All authors contributed to the editorial process and approved the final manuscript.

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Chapter 4

MR, HP, WP, and PS developed research questions, study design, and research methods, with expert input from AG, VA, GH, YW, and LS. The manuscript was written primarily by MR, with assistance from HP and PS. Data were collected by WP and LS and provided to MR for statistical analysis. All authors contributed to the editorial process and approved the final manuscript.

Chapter 5a

All authors made significant intellectual contributions to this manuscript. MR, HP, WP, and PS developed the research questions, study design and research methods, with expert input from AG, VA, GH, YW, and LS. The manuscript was written primarily by MR, with assistance from HP and

PS. Data were collected and statistically analyzed by MR with expert input from PS, HP, and AG. All authors contributed to the editorial process and approved the final manuscript.

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Chapter 5b

All authors made significant intellectual contributions to this manuscript. MR, HP, WP, and PS developed the research questions, study design, and research methods, with additional expertise and consultation provided by AG, VA, GH, YW, and LS. The Manuscript was written primarily by MR, with assistance from HP and PS. Data were collected and statistically analyzed by MR with the assistance of PS, HP, and AG. All authors contributed to the editorial process and approved the final manuscript.

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DEDICATION

First and foremost, this dissertation is dedicated to the countless young people who struggle with mental illness. I hope this research is a worthy contribution to the ongoing pursuit of improving the lives of the vulnerable. To the truly courageous children and adolescents at the Be Brave Ranch—those who in their short lives have endured so much adversity—thank you for exemplifying the power of resilience.

I also dedicate this dissertation to the intellectual giants upon whose shoulders I am privileged to stand. Your wisdom, influence, and guidance has been instrumental in my development as an academic and a human being.

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List of Abbreviations

ACE	Adverse Childhood Experience
BBR	The Be Brave Ranch
CAMHS	Child and Adolescent Mental Health Services
CSA	Child Sexual Abuse
HPA	Hypothalamic Pituitary Adrenal
KT	Knowledge Translation
PTSD	Posttraumatic Stress Disorder
tf-CBT	trauma-focused Cognitive Behavioral Therapy

Chapter 1: Introduction

1.1 The Burden of Mental Illness

Mental illness has quickly become one of the most pressing problems facing health systems today. The global prevalence of mental health disorders varies by region, but it estimated that over 12% of the world population currently meets the criteria for a mental illness[1]. A 2016 survey revealed that mental health disorders impacted over a billion people worldwide[2]. In Canada, it is approximated that nearly half of Canadians will face an addiction or mental health issue by the age of 40[3]. The Mental Health Commission of Canada (MHCC) estimates the combined economic impact of mental illness and substance abuse in Canada to be over $90 billion per year[4-6]. Individuals suffering from mental health problems are more likely to be unemployed[7], absent from work[8], encounter the criminal justice system, and engage in substance misuse[6]. Sadly, recent investigation has shown no reduction in the global burden of mental illness over the last 30 years[8].

According to the Lancet Commission on global mental health and sustainable development[9], the disability adjusted life-year (DALY)–which is an indication of the number of healthy life years lost due to a health problem—increased globally from 1991-2016 from 6.6 to 9.4 years for mental and substance use disorders, Alzheimer’s disease and other dementias, and suicide. Interestingly, the DALY for mental illness is significantly larger in high sociodemographic index (SDI) populations, increasing from 13.6 to 16.2 years over the same timeframe; however, low and low-middle SDI populations have seen the largest relative increase over time, both nearly doubling over the last three decades[9]. Geographically, the DALY per 100 000 were highest in North America, South America, Australia, and parts of North and Sub-Saharan Africa[1]. Summating DALY within a population can give an indication of disease burden by representing the gap between an ideal health situation and the current health status. When stratifying for age, the disease burden of mental and substance use disorders is highest for individuals aged 25-29 (roughly 14% disease burden) but is over 10% for all cohorts between the ages of 10-49 years. Notably, the global burden of disease rises significantly from 5% to 13% in the 5-9 year-old cohort to the 10-14 cohort. Considering nearly 75% of people suffering from psychiatric disorders experience the onset of their illness prior to the age of 24[5,10], it is reasonable to hypothesize that strategies directed at prevention and early-treatment for mentally ill youth may prospectively alleviate the burden of mental illness in older populations. At present, there is limited research examining best-practice and evidence-based treatment options for youth psychiatric patients. Furthermore, there is a scarcity of literature investigating the appropriate assessment tools necessary to determine treatment success.

1.2 Prevalence

The Diagnostic and Statistical Manual of Mental Disorders, fifth edition, text revision (DSM-V-TR) is a tool used to identify and diagnose mental illnesses. A mental disorder is a behavioural or psychological problem that reflects an underlying psychobiological disturbance that impairs an individual's ability to function normally[11]. Mental disorders tend to be bifurcated into *internalizing problems*, in which symptoms manifest internally and somatically (e.g., depressive and anxiety disorders), and *externalizing problems,* where individuals regularly engage in impulsive or disruptive behaviors (e.g., conduct disorder (CD), oppositional defiant disorder (ODD), attention-deficit/hyperactivity disorder (ADHD))[1,11]. A substance-related or addictive disorder is a common type of externalizing disorder that occurs when overuse of an illegal drug, alcohol, nicotine, or pharmaceutical causes a major impairment in an individual's ability to properly function[12]. It is important to note that although mental illness and substance abuse are not the same, they commonly co-occur and are often the cause of each other[13,14]. Globally, one in seven youth aged 10-19 is afflicted with a mental illness or substance use disorder; this translates to over 170 million individuals[15]. Comparatively in Canada, approximately 1.2 million children and adolescents are affected by a mental illness, and an estimated 1 in 5 Canadians will develop a mental illness prior to the age of 25[16,17]. Over 10% of Canadian youth aged 15-24 are diagnosed with a substance use disorder, with adolescent males having a three-fold increased risk for alcohol and cannabis abuse[18]. Young males aged 5-25 are more likely to be diagnosed with CD, ODD, ADHD, autism spectrum disorder (ASD), and idiopathic developmental intellectual disability; young females have higher rates of mood and eating disorders[1,15].

There is some evidence that rates of child and adolescent mental illness have increased over the last 25 years, but much of this varies depending on the population in question. For example, a systematic review conducted by Bor et al. (2014)[19] found that the prevalence of externalizing problems has plateaued over the last two decades, but internalizing problems, particularly in adolescent females, have increased. Adolescents and young adults are particularly susceptible to anxiety, depression, and behavioural disorders, with youth aged 15-24 having the highest risk for psychiatric issues[18,20]. The World Health Organization (WHO) estimates that 5-7% of children aged 10-19 meet the diagnostic criteria for an anxiety or depressive disorder[15]. Perhaps most significantly, suicide is the fourth leading cause of death among adolescents worldwide, and accounts for over a quarter of deaths for youth aged 15-24[15,16]. For Canadian children and adolescents aged 10-19, suicide is the second leading cause of death. Females account for nearly three quarters of self-harm hospitalizations, while 70% of those who commit suicidal are male[21]. Indigenous Canadians are particularly susceptible to mental illness and suicide[22]. Indigenous children and adolescents die by suicide at 5-6 times the rate of non-Indigenous youth; for Inuit children and adolescents, the rate of suicide is 11 times higher than the national average[16].

In a review of secular trends in child and adolescent mental health, Collishaw et al. (2015)[23] suggested four hypotheses for the apparent rise in youth mental illness. First, there may be increased individual vulnerability to mental illness as a result of pre- and post-natal impacts (e.g., teratogen exposure, premature birth, maternal stress), or biological/environmental changes that disrupt endocrine homeostasis which may impact the onset of puberty and development. Second, changes in family life, such as divorce or intrafamilial conflict may leave children more vulnerable to the onset of mental illness. Living with a parent who is mentally ill increases the risk for youth psychiatric problems[24]. This is significant considering over a third of mothers and fathers of children receiving psychiatric treatment report having a mental illness[25]. Third, extrafamilial psychosocial influences that impact mental health may be having a greater impact on youth than in previous generations. For example, the rise of social media has increased the number of victims of bullying—especially in the cybersphere—which often results in the onset of antisocial behavior and substance abuse in victims[26,27]. Finally, changes in broader socioeconomic and cultural influences, including decreased stigmatization and a greater level of awareness regarding youth mental illness, may be responsible for the rise in reported mental illness among young people. The authors note that it is important to emphasize this final point, as it may be the primary reason for the reported increase in child psychiatric disorders. It is difficult to retrospectively compare prevalence when the tools and resources necessary for identification have changed over time. However, these hypotheses do not consider the impact of genetic predisposition and heritable factors on mental health. Susceptibility to mental illness varies between individuals depending on genetic predispositions, environmental influences, and the complex interplay between these two components (i.e., genes x environment interactions)[28].

1.3 Early-life Stress and Epigenetics

Brain development is a complex interaction of genetic predispositions and environmental experiences. As humans are an altricial species (i.e., producing offspring that are highly dependent on parental care upon birth), young brains are particularly plastic and susceptible to experiential influences[29]. The benefit of this plasticity is the human capacity for creativity, ingenuity, and improvisation; the resultant trade-off is that young brains are more vulnerable to stressful experiences. If a threatening event, or series of events, induces a strong enough stress response in the developing brain, trauma is said to have occurred[30]. The impact early-life stress has on brain development and the onset of mental illness is an area of research that has garnered more attention since the publication of the seminal Adverse Childhood Experiences (ACE) Study in 1998[31]. The findings of the ACE study revealed a strong relationship between early-life abuse and household dysfunction with the leading causes of adult fatality (e.g., ischemic heart disease, cancer, liver disease, etc.). Further investigation into ACEs has shown that early-life stress increases individual risk for PTSD, mood disorders, behavioural problems, and substance abuse in adolescence and adulthood[32-34]. However, not all individuals with early-life trauma suffer from mental illness and not all individuals with mental illness have necessarily experienced adverse events in their childhood. There are a number of factors related to resilience, including positive peer interactions, individual personality characteristics, caregiver/familial relationships, and perception of safety that can impact long-term outcomes[35]. The complex interaction of environmental influences, genetic predispositions, and resilience factors are mediated through the intricate mechanisms of epigenetics.

The field of epigenetics ("above genetics") encompasses a number of heritable intracellular mechanisms that regulate gene transcription and translation without direct modification to the genetic code itself[36]. The two most commonly investigated mechanisms are DNA methylation and histone acetylation. In the former mechanism, methylation of cytosine nucleotides at promoter regions of specific genes can either prevent or enhance the binding of important transcription proteins, effectively controlling gene expression[37]. Gene transcription can also be influenced by the degree of DNA coiling around histone proteins. Tightly wound DNA—known as heterochromatin—is less accessible to transcription factors than loosely wound euchromatin. Acetylation of lysine residues on histone proteins neutralizes their charge and prevents them from binding to the negatively charged backbone of DNA; this results in loosely bound euchromatin and an increase in DNA transcription. Likewise, histone deacetylation induces heterochromatin formation and a decrease in gene transcription. By measuring the degree of DNA methylation or histone acetylation in particular genes, researchers can compare epigenetic profiles of different individuals to elucidate the impact of stressful experiences on brain development.

Twin studies have revealed differential epigenetic profiles between siblings with different environmental backgrounds[38,39], which may help explain variability in mental health between genetically similar individuals. A study conducted by Meaney & Szyf (2005)[40] compared epigenetic profiles of genes responsible for the expression of the glucocorticoid receptor (GR) in mouse pups. The GR is an essential component of the hypothalamic-pituitary-adrenal (HPA) axis—the primary hormonal pathway for stress regulation in the body. Binding of free cortisol to the GR inhibits the HPA axis and reduces the stress response, effectively acting as a regulatory feedback mechanism. The researchers compared methylation rates of GR-linked genes in mouse pups raised by nurturing high-grooming (HG) mothers, or by low-grooming (LG) mothers. The findings revealed that pups of LG mothers had changes in DNA methylation and histone acetylation that reduced GR expression and caused overactivation of the HPA axis as compared to pups of HG mothers. Interestingly, these effects were reversed when LG pups were cross-fostered to HG mothers. Similar studies have shown comparable results[41]. Human studies on epigenetics and early-life stress have replicated these impacts on the HPA axis[42] including an increased susceptibility to chronic inflammation and neuro-endocrine dysregulation[43]. Perhaps most significantly, epigenetic changes from early-life stress can be heritable and multigenerational.

Research conducted by Yehuda et al. (2016)[44] investigated the epigenetic profiles of Holocaust survivors and their offspring and found both groups had altered methylation levels on certain sites of the FKBP5 gene, which is linked to GR expression. Dysfunction in this gene has been associated with increased risk for major depressive disorder (MDD)[46]. In a Canadian context, the impact of intergenerational trauma is particularly relevant to the offspring of survivors of the Indian Residential Schools (IRS), which likely contributes to the disproportionate prevalence of mental illness and substance abuse in Indigenous Canadian populations[47]. Services directed at treating mental ill children and adolescents should consider individual and familial trauma histories as a routine part of screening and assessment. The MHCC released the Youth Strategy Report which outlines the importance of engaging with First Nations, Inuit, and Metis populations in order to effectively meet the distinct cultural and mental health needs of these communities[48].

1.4 Services and Treatment

To date, much of the strategy towards mental illness has been to reactively treat adults rather than proactively prevent the onset of chronic mental illness through early identification and treatment in youth[49]. In Canada, fewer than 1 in 5 individuals under the age of 18 receives appropriate treatment for their mental health or substance use problem[16]. The MHCC Youth Strategy Report highlighted improving service access as a high priority for youth mental health in Canada[48]. It is essential that these services are easily accessible and available to those who need them. There is growing evidence that strategies focused on early detection and timely intervention can provide long-term health and socioeconomic benefits by preventing the onset of mental illness in childhood and the subsequent impact non-treatment has on the developing individual[50].

When accessible, a variety of treatment services are available to mentally ill youth, including inpatient services, outpatient programs, community-based programs, and, more recently, both synchronous and asynchronous online psychotherapy[51-54]. Following diagnostic screening, the National Institute for Health and Care Excellence (NICE) guidelines suggests self-help and psychosocial strategies such as improving hygiene, sleep patterns, diet, encouraging exercise, anti-bullying strategies (if applicable), and addressing any parental mental illness, as the first step in treatment[51]. Both the Canadian Network for Mood and Anxiety Treatments (CANMAT) and the

NICE guidelines recommend psychotherapy as the first line intervention for children and adolescents with mood disorders[55]. Pharmacotherapy, such as selective serotonin reuptake inhibitors (SSRIs), are suggested as second and third line treatment options for non-responders to CBT or other psychotherapies[51,55]. A meta-analysis on psychotherapy in children revealed both cognitive behavioural therapy (CBT) and interpersonal therapy (IPT) to be superior to comparison conditions (e.g., placebo, waitlist, treatment as usual)[56,57], and remote internet-based interventions have been shown to be effective in treating depression for youth, particularly adolescents[58,59]. Treatment resistant individuals may benefit from polytherapy (e.g., psychotherapy + pharmacotherapy) which has yielded mixed results in this population[60]; however, pharmacotherapy combined with CBT for suicide prevention appears to be an effective strategy, particularly for depressed children and adolescents with a recent suicide attempt.

Inpatient and residential treatment programs are the most time- and resource-intensive options available, and preliminary evidence suggests they may be effective at treating children and adolescents with severe mental health problems[53,61]. In Alberta, an estimated 25% of the mental health budget is allocated towards inpatient services[54]. There is significant heterogeneity in the structure of inpatient and residential program design (e.g., eligibility criteria for admission, which therapeutic options are included, how long participants attend treatment, etc.), but programs generally provide 24-hour multi-disciplinary treatment[62]. Residential programs are less intensive than inpatient care but are often reserved for children and adolescents with complex mental health concerns—defined as presenting major impairments in psychological, emotional, social and/or behavioural functioning at home, school, and/or the community[61,63]. Preliminary evidence investigating intensive treatment options for mentally ill youth suggest that these programs may provide positive gains over the course of treatment; however, there is a significant lack of transitional programs and follow-up data after discharge[64,65]. Without routine follow-up, it is difficult to determine whether the positive effects of treatment are sustained.

Appropriately evaluating the impact of inpatient or residential treatment programs requires that they must first be assessed on their efficacy and then their effectiveness. Efficacy is defined as the capacity for an intervention to produce a desired outcome under specific circumstances; efficacy studies are highly-controlled experiments which investigate the impact of an intervention on a study sample[66]. Effectiveness considers the how well a specific outcome is produced in "real-world" settings. Effectiveness studies are designed to investigate the application of an intervention scaled to the general population[66]. Research evaluating treatment outcomes in youth residential programs is sparse[67], and routine collection of measures related to treatment success is seldom conducted[68]. It is even suggested that the majority of youth mental health clinical services have little or no evidence of effectiveness[69]. As such, these programs are in need of robust critical appraisal. One barrier to effectively evaluating residential treatment is the challenge associated with conducting randomized-controlled trials (RCTs) on children and adolescents, as it is unethical to withhold an intervention from a youth in need. Some studies may include a comparison group that is exposed to a less intensive intervention or maintains treatment-as-usual in a particular setting; unfortunately, very few evaluative studies implement these strategies, which makes it difficult to clearly determine treatment effects[67,68]. One methodological solution to this constraint is the stepped-wedge design (SWD) which initiates participant data collection prior to the onset of an intervention[70]. In a SWD, participants are randomized by the time of intervention onset rather than whether or not they receive the intervention. The SWD provides outcome data from participants with and without treatment; as such, individuals act as their own control[71]. This method is particularly useful for intensive treatment programs which are often limited in the number of participants that can be admitted at any given time. A recent example of a proposed SWD in this context is the MULTI+ study which plans to evaluate the effectiveness and implementation of a multidisciplinary lifestyle treatment for adolescent psychiatric inpatients[72]. Those inpatients waiting to receive the intervention will continue treatment-as-usual (i.e., inpatient care) to avoid withholding treatment from a vulnerable population, while still evaluating the implementation of a novel approach. Utilizing these research methods will improve assessments of youth mental health treatment programs.

The 2015 MHCC Youth Strategy Report outlined six strategies to improve outcomes for mental ill youth[49]. First, to reduce incidence rates, a focus on lifelong prevention by identifying which groups are in need; second, strategies aimed at improving wellbeing and recovery by providing respect, choices, and rights; third, improving access to appropriate services; fourth, ensuring all populations have equal access to appropriate services; fifth, engaging with Indigenous communities to improve outcomes for these communities while acknowledging cultural considerations; and sixth, encouraging inter- and intra-disciplinary collaboration at all levels. However, in order for these suggestions to be implemented, sufficient resources need to be distributed to CAMHS. A report by the Canadian Paediatric Society recommended three policy changes for the federal mental health budget: (1) The government should allocate 1/3 of federal mental health funding to ensure equitable and timely access to appropriate treatment for youth under the age of 25; (2) Invest in the development of clinical practice guidelines that focus on patient-centered stepped care, in which patients are triaged into the most appropriate treatment available; (3) Provide significant resources to the development of psychoeducational resources and interdisciplinary training programs to improve quality of care[73]. The implementation of these strategies will reduce the economic burden of mental illness by proactively preventing the development of serious, untreated mental illness.

The Alberta Quality Matrix for Health[74] is a tool designed to maximize the efficiency of health research and treatment and may be a useful model for other provinces to follow. The matrix combines six dimensions of quality, focused on the patient/client experience with specific areas of need in the healthcare system, namely: (1) Being healthy and maintaining a healthy lifestyle; (2) Improving from acute illness or injury; (3) Managing and learning to live with a chronic condition; (4) Maximizing care for elderly and palliative patients. The British Colombia quality matrix for health includes some notable differences in their categorizations that are also worthy of consideration. This includes differentiating between system perspectives (i.e., equity and efficiency of services) from individual perspectives (i.e., respect, safety, accessibility, effectiveness, and appropriateness)[75]. This matrix also considers the importance of optimizing early life by improving maternal health and encouraging healthy development in youth.

One major challenge to treating this children and adolescents is the heterogeneity in symptom manifestation and the timing of symptom onset[49]. When defining youth, it may be more appropriate to differentiate between developmental stages, such as pre-pubescent children (aged 0-12), adolescents (aged 12-17), and young adults (aged 18-25)[13]. These groups differ from each other not just in physiological terms, but psychologically as well. For instance, there is evidence that the degree to which an individual believes that personal traits are ingrained and non-malleable is predictive of treatment outcome and mental illness severity[76]. Many of these sets of beliefs, known as implicit theories, are dependent on environmental influences (e.g., caregivers, peer groups, etc.) and intellectual capacity, both of which change over the course of development. Clearly defining eligibility criteria for intensive treatment programs is the first of nine critical factors for success outlined by Johnson et al. (2015)[62]. Other characteristics include the program adopting a family-centered approach; having cohesive interprofessional staff; maintaining cultural and linguistic competence; providing individualized and appropriate programming; developing seamless transition and integrated aftercare with community partners; and performance management and evaluation. The final factor, assessment of treatment, is of particular importance as it is extremely difficult to determine treatment success without gathering data that measures treatment outcomes[77].

1.5 Outcome Measures

As mental health concerns faced by youth vary considerably, it is difficult to determine which specific indicators are most significant for interpreting effective treatment[62]. Standardized assessments are generally accepted for use by practitioners but are infrequently applied in routine practice[78]. Perhaps the most important aspect of any health service is the implementation of outcome measures and assessment tools to capture the impact of treatment on specific populations[48]. Outcome measures are essential indicators of longitudinal change over the course of an intervention[79]. Utilizing outcome measures effectively helps health care professionals to make informed clinical decisions that maximize the impact of treatment[80]. Psychiatric assessment tools generally come in the form of questionnaires, in which each question is scored on a Likert scale. Assessment tools can be self-report from the patient, clinician-rated, or stakeholder-rated (e.g., caregivers, teachers, community members, etc.). The Health of the Nation Outcome Scale (HoNOS) was a tool originally developed to assist clinicians in mapping progress of patients with severe mental illness[81]. The child and adolescent version of this questionnaire (HoNOSCA) has the potential to be an appropriate tool for this population but may neglect the impact of family and peer relationships and may not fully capture the heterogeneity of youth mental illness[81]. A systematic review of mental health outcome measures for young people aged 12-25 noted five tools considered appropriate for this population, despite none being specifically designed for youth[82]. The five outcome measures noted were: (1) Kessler Psychological Distress Scale (K10);

(2) Clinical Global Impressions Scale – Severity of Illness (CGI-S); (3) Global Assessment of Functioning (GAF); (4) Medical Outcomes Study 36-item Short Form Healthy Survey (SF-36); (5) World Health Organization Quality of Life Instrument-Brief (WHOQOL). At the time this review was collected, none of these measures had been specifically tested for clinical utility in a child and adolescent context[82]. Since then, only the K10 and SF-36 have been validated as useful tools for young people[83,84]. The shorter versions of these measures—the K6 and SF-12, respectively—have also shown clinical utility for adolescents[84,85]. Adherence to routine outcome assessment is highly dependent on the time investment required to complete the measure, both for the patient and service provider; as such, outcome measures that are thorough and brief are considered ideal[78,79]. These measures provide good indications of general mental health and welfare, including information related to physical health, emotional regulation, educational success, and peer/friend relationships, but are less specific to particular disorders. Several outcome tools are currently available for specific mental illnesses; for example, the Revised Children's Anxiety and Depression Scale (RCADS), the Patient Health Questionnaire – adolescent version (PHQ-A), and the Generalized Anxiety Disorder Scale (GAD) have been accepted as useful tools for measuring mood disorders in youth[86]. Likewise, the Child PTSD Symptom Scale (CPSS), the Obsessive Compulsive Inventory for Children, the KIDSCREEN-10 quality of life measure, the Rosenberg self-esteem scale, and the Columbia Suicide Severity Rating Scale have all been recommended as functional assessment tools for this population[86]. In general, combining assessments from a variety of sources will give the best indication of treatment effects; this is particularly true in a youth setting in which particular stakeholders, such as parents or teachers, have a significant impact on outcomes[87]. Outcomes that consider the dyadic relationship between youth and their caregivers are should be utilized[88]. Measures that evaluate family functioning, such as the Family Assessment Device (FAD), are useful tools in developing the context for each individual[89]. These measures can give an indication into the health of the parent-child dyad, which is a strong determinant of psychiatric treatment outcomes[90]. In a trauma context, parental reflective functioning (i.e., the caregiver's capacity to understand their child's mental state) is a key factor in child attachment and the health of the caregiver-child dyad[91]. Implementing validated measures of reflective functioning, such as the self-report Reflective Functioning Questionnaire (RFQ), may be a useful addition to any outcome assessment strategy[92]. This may be particularly true in the context of early-life and intergenerational trauma[93].

Despite the utility of assessment tools, current research investigating best-practice and evidence-based outcome measures in child and adolescent mental health is sparse. Moreover, assessment tools used in practice may not capture critical elements of recovery such as quality of life, satisfaction with services, and information regarding relevant stakeholders. In order to be appropriate for practice, outcome measures must be both reliable and valid, but also brief and easy enough to realistically administer in a clinical setting[78,94]. Reliability refers to the ability of an outcome measure to consistently find the same result; robust assessment tools should find similar results in test-retest conditions and maintain internal consistency[94]. The validity of an outcome measure is an indication of the degree to which the measure actually assesses the outcome in question. In psychiatric settings, determining the validity of an outcome measure can be difficult because these assessments are predicated on loosely defined outcomes. For example, tools designed for the assessment of intelligence have long been contested because many are developed to measure a particular way of thinking and may not be an accurate representation of intelligence across populations[95]. There is also evidence that perceived change by the patient may differ from the quantifiable measured change noted by the healthcare professional[96]. In a mental health context, validity can be improved by defining "meaningful changes" based on the values considered essential to the client, family, or clinician[97]. In order for an outcome to be useful, it must first be properly defined within the context of the service being provided. When used properly, routine outcome measurements can assist in assessing the effectiveness of a health service, as well as help engage with relevant stakeholders in order to achieve the goals of treatment[98].

1.6 Treatment Assessment and Evidence-Based Implementation

Over the course of the 20th century, psychiatry in Canada evolved from a focus on subjective clinical inference to a focus on evidence-based practice[99]. Evidence-based practice refers to the implementation of interventions that have undergone scientific assessment for quality, robustness, or validity[100]. Best-practice treatment options are determined by appraising evidence supportive of the intervention(s) in question. The National Institutes of Health (NIH) have outlined methodologies to evaluate the quality of scientific research[101]. Assessing the underlying evidence for a therapeutic approach helps to determine whether a particular intervention is likely to improve health outcomes. In a review of evidence-based psychosocial treatments for youth exposed to trauma, Dorsey et al. (2017)[102] classified interventions as either well-established, probably efficacious, possibly efficacious, experimental, or questionably efficacious depending on the amount of assessment data available. In the CAMHS context, it is essential to differentiate therapies by the quality and quantity of evidence available in order to determine best-practice treatment guidelines[100,103].

When evaluating interventions or treatment effects in mental health, it is important to distinguish between efficacy and effectiveness. Between-group efficacy studies, such as RCTs, are useful in distilling treatment effects and strengthening the evidence-base for a particular intervention[103]. However, it is essential to acknowledge that the apparent value of treatments validated in efficacy studies may not necessarily translate into effective interventions when implemented in routine practice[104]. Knowledge translation (KT) refers to the ongoing process of using scientific evidence to implement strategies and services aimed at improving the healthcare system[105]. There are several notable barriers to KT, including constraints on time and resources, organizational culture and attitudes resistant to change, technical challenges (i.e., obtaining the required technology to implement a service), or cognitive impediments (e.g., ability to access and comprehend primary scientific literature)[105,106]. For KT to be successful, facilitators to implementation must be bolstered. Effective implementation requires an integration of organization- and clinician-level strategies aimed at enabling KT[107]. Improving systemic attitudes towards KT, encouraging self-efficacy and knowledge acquisition in service providers, and allocating appropriate resources towards implementation are key determinants in improving evidence-based practice[105-107].

In a psychiatric context, measurement-based care—which incorporates routine collection of assessment measures—may inform treatment approaches and improve outcomes[108]. Efficacy studies often use changes in standardized measures of central tendency (e.g., mean or median) of assessment scales to determine treatment effects[109,110]. The findings of these studies can act as benchmarks for replication studies and larger trials that aim to build on pre-existing evidence[111]. In CAMHS, collecting data from multiple stakeholders and multiple timepoints is particularly important in improving the validity of the research[112]. There is some debate as to whether parental involvement in treatment is necessary[113,114], but empirical evidence suggests that including some level of family involvement in treatment and data collection improves outcomes[102,115]. Effective therapeutic assessment requires collaboration between stakeholders and service providers to determine the definition of success[116]. Furthermore, treatment efficacy is highly dependent on the outcomes and intervention being studied. For example, trauma-informed interventions are considered effective if trauma-related symptomatology is reduced; whereas, the success of relation-based interventions, such as family therapy, are predicated on behavioural outcomes and family functioning[117]. Explicitly defining the metrics under investigation is an essential aspect of any treatment evaluation.

Assessing the efficacy of an intervention is only one form of treatment assessment. As outlined by the Alberta Quality Matrix for Health[73], in order for interventions to be considered fully evaluated, they must be assessed for acceptability, accessibility, appropriateness, effectiveness, efficiency, and safety. Treatment acceptability determines the level at which participants are likely to engage in an intervention and is often measured by the rate of adherence[118,119]. Treatment acceptability is a key predictor of whether an intervention will be useful when implemented at scale, but findings can often be biased because data is usually collected only from participants who are willing to engage with the intervention[119]. Treatment accessibility and appropriateness are important determinants of KT because inaccessible and inappropriate interventions are bound to face resistance by service providers and administrators[118,119]. Assuring that treatments are safe at a sample level is necessary considering the risk for adverse events increase when an intervention available to the public[120]. Finally, creating the most efficient and cost-effective treatments lowers the resource constraint barrier and improves the likelihood of successful implementation[105,117,122]. Despite the importance of evaluating treatments along these dimensions, treatment assessment instruments are often underutilized and the majority of evidence-based research is primarily aimed at determining the efficacy of an intervention[102,112].

1.7 Aims of the Dissertation

Child and adolescent mental health services need robust, evidence-based research directed at improving the acceptability, accessibility, appropriateness, effectiveness, efficiency, and safety of these services. Considering the vast economic and social burden of mental illness, strategies aimed at prevention and amelioration should be prioritized. In particular, policies that identify and treat vulnerable populations are essential to proactively prevent the onset or reduce the severity of mental illness. Routine outcome assessment is imperative to monitor the effectiveness of these services and can assist in identifying which individuals are most likely to benefit from which treatment.

Broadly speaking, the aim of this dissertation is to investigate ways in which child and adolescent mental health services can be improved, with a specific focus on the utilization of assessment measures. This dissertation aims to investigate outcomes relevant to treatment success to explore the utility of particular assessment strategies in child and adolescent mental health treatment programs. With consideration of the strong link between early-life trauma and mental illness, the primary treatment program under investigation is specifically designed for youth survivors of child sexual abuse (CSA) aged 8-17 years. This research uses both qualitative and quantitative methods to utilize data gathered from youth mental health stakeholders. These findings assisted with the implementation of routine outcome assessment in a residential treatment center designed for youth with a history of CSA.

1.8 Specific Study Objectives

Study 1: To explore the perceptions of stakeholders involved in a child and adolescent psychiatric inpatient unit in order to develop a better understanding of factors relevant to treatment success and stakeholder satisfaction.

Study 2: To assess the impact of a complex multimodal treatment program designed for child sexual abuse survivors aged 8-12 on age-standard cognitive performance.

Study 3: To assess the impact of a complex multimodal treatment program designed for adolescent females aged 13-17 on a number of mental health domains including PTSD, depression, anxiety, quality of life, self-esteem, and resilience.

Study 4a: To examine the relationship between biological caregivers of child sexual abuse survivors and their children in terms of ACE history, as well as how the distribution of ACE scores in this population compares to the standard population.

Study 4b: To evaluate the impact of a complex multimodal treatment program designed for youth child sexual abuse survivors aged 8-17 on mental health outcomes including PTSD, depression, anxiety, quality of life, and self-esteem. Secondary to this, to explore the impact of the COVID-19 pandemic on treatment outcomes.

1.9 Potential Impact of the Dissertation

This dissertation aims to add new knowledge to the field of child and adolescent mental health treatment and services. The vast economic and social burden of mental illness can be significantly alleviated by investing in strategies targeted at prevention and treatment of children and adolescents[121]. Developing effective mental health services for youth is paramount to maximizing treatment efficiency[122]. Considering youth mental health is an often neglected area of research, there is a significant need for the generation of novel research data. Treatment success (i.e., whether or not a patient benefits from treatment) can only be assessed through routine collection of outcome measures. Unfortunately, very few CAMHS presently implement the use of standardized assessment tools. The first part of this dissertation investigates stakeholder perceptions of treatment success in a youth psychiatric inpatient unit. The goal of this analysis was to learn how outcome measures are currently used in clinical practice and use these results to inform policy makers how these findings can guide future research in CAMHS.

The second part of this dissertation focuses on a novel residential treatment program specifically designed for child and adolescent CSA survivors. This program recognized the importance of using routine outcome measurement and was intentionally designed to include regular data collection. The author was fortunate to have access to this convenience sample, and felt it was an excellent opportunity to assess the implementation of routine outcome measurement as means to evaluate a novel youth residential treatment program designed for CSA survivors. The findings of these studies may stimulate further investigation into whether youth treatment programs are better utilized when aimed at specific experiences rather than symptoms.

Finally, as a result of the COVID-19 pandemic, this dissertation presents data collected before and after the pandemic's onset. The asymmetry in daily life for children and adolescents prior to and during the pandemic has been significant. These findings may provide preliminary insight into the additive impact of mass trauma on child and adolescents with a history of early-life trauma.

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Chapter 2: Stakeholder Perceptions in a Child and Adolescent Psychiatric Inpatient Unit: A Qualitative Analysis

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2.1 Abstract

Background: Child and adolescent psychiatric inpatient programs provide patients with prolonged and intensive therapy; however, they require significant resource and time investment. Data relating to the effectiveness of program offerings are essential in guiding policy and resource allocation in this context. To date, there is a paucity of research related to stakeholder perceptions in child and adolescent psychiatric inpatient services—especially how these perceptions coincide with the outcomes of these services.

Study Objective: The aim of this study was to develop a better understanding of the perceptions of stakeholders in an established youth psychiatric inpatient program in an urban hospital setting.

Methods: Exploratory qualitative methodology and thematic analysis was used to examine the common challenges faced by stakeholders in a youth psychiatric inpatient program. Three focus groups were carried out, two with caregivers of youth being treated in the program and a third with the staff of the inpatient unit. Discussions were transcribed and analyzed thematically.

Results: Thematic analysis of the focus group discussions identified five interacting categories that are pertinent to the perception of positive outcomes: (1) youth mental health and well-being; (2) caregiver mental health and well-being; (3) the health of the caregiver-child dyad; (4) education, socialization, & occupation; (5) institutional interactions.

Conclusions: Stakeholder perceptions to child and adolescent inpatient services were generally positive, but both caregivers and service providers identified a number of major gaps and problems in defining treatment outcomes in this setting. This preliminary analysis provides the impetus for further research into the development of tools aimed at capturing these aspects.

Key Words: Inpatient, Psychiatric, Mental Health, Youth, Stakeholders, Qualitative

2.2 Introduction

Child and adolescent mental illness and addiction have a significant impact on public health services. An estimated 20% of Canadians experience a mental health or addiction issue in their lifetime, and by the age of 40, nearly half of the population will have faced some form of mental illness[1]. Significantly, over 33% of affected individuals present their onset of symptoms prior to the age of 18[2]. In fact, youth aged 15-24 are at the highest risk for psychiatric issues and substance use disorders[3]. In Canada, the economic burden of mental illness and addiction was an estimated at around $89 billion per year[1,4,5]. Despite the economic burden that mental illness and addiction continue to place on society, psychiatric programs are often underfunded, while poor access to services and increasingly long waiting lists have become the norm[6]. These issues are especially pertinent for Child and Adolescent Mental Health Services (CAMHS)[7].

In Edmonton, Alberta in Canada the number of children and adolescents referred for mental health services increased nearly 50% from 2013-2019, from approximately 3500 to 6700[8]. Over 60% of referrals are for youth aged 11-17; more specifically, 40% are for adolescents between 14-17 years of age. Standard practice currently involves triaging referred individuals through a telephone interview designed to identify the presenting problem and assess the degree of risk. This is followed by placement on a waiting list for access to an appropriate intervention. Once available, patients may be offered outpatient treatment—which includes day treatment programs, individual therapy, mobile services, and residential treatment programs—or inpatient programs. In Alberta, roughly 5% of children and adolescents require inpatient psychiatric treatment[9], and it estimated that nearly a quarter of the mental health budgets is allocated towards inpatient services[10].

A recent survey conducted by Wild et al. (2014)[10] identified major gaps in service availability within Alberta. They concluded that the current mental health infrastructure is insufficient to effectively treat Alberta adults, despite the fact that the system is heavily invested in adult services rather than CAMHS. That analysis is supported by the report that only around 12-15% of children and adolescents who have a mental health or addiction issue will receive appropriate clinical treatment or intervention[11,12]. In Alberta, an average of 1 in 5 youth psychiatric referrals results in unsuccessful contact, withdrawn referral, or absence from intake interview[8]. At present, there is no follow-up program in place to track what happens to those referrals that go unplaced.

Contemporary research assessing the efficacy of child and adolescent inpatient services is sparse. Inpatient services are of particular importance because they require the greatest amount of service resources and staff involvement, while serving fewer patients than community care[13]. Unfortunately, there is no current agreement on the optimal length of admission, the interventions used, the effectiveness of the interventions administered, and the longevity of treatment effects[14]. Furthermore, without adequate transition and follow-up programs, the risk of re-admission remains high in these populations[15]. The few studies that have assessed inpatient programs have shown clinically meaningful changes. A study conducted by Green et al. (2007)[13] investigated changes in Child Global Assessment Scale (CGAS) scores for children and adolescents undergoing inpatient treatment in four different inpatient units at admission, discharge, and one-year follow-up. The analysis showed clinically and statistically significant improvement for both children and adolescents undergoing psychiatric inpatient treatment. Further to this, CGAS improvements were associated with the length of stay, independent of diagnosis, which suggests further evidence for the positive effect of longitudinal intensive treatment.

Although these observed improvements are encouraging, there are still a number of gaps in child and adolescent inpatient services that need to be addressed. In an analysis of practitioner perceptions towards standardized diagnostic assessments, Martin et al. (2011)[16] found that over a quarter of child and adolescent service providers had little to no qualification or training in working with youth. The lack of relevant knowledge and training, the time required to care for each individual child or adolescent, and the scarcity of resources afforded to service providers are all major barriers to managing youth psychiatric problems[17]. As mental health concerns faced by youth vary considerably, it is difficult to determine which specific indicators are most significant in interpreting effective treatment. Considering the increasing prevalence mental illness in Canadian youth, alternative approaches are urgently required. In order to reliably assess treatment efficacy, it is imperative there be the implementation of thorough and accurate evaluative measures[18]. Standardized assessments are generally accepted for use by practitioners but are infrequently applied in routine practice[16]. In order to properly evaluate the efficacy of any treatment regimen, the definition of “successful” or “positive” first needs to be clearly determined[19,20]. Satisfaction levels of young people and their caregivers is predictive of treatment outcomes in inpatient services, and stakeholder perceptions are an important consideration when investigating treatment success[21]. Mental illness is never isolated to one individual—particularly within the child and adolescent context where caregivers and family members are almost always impacted[22]. Further to this, staff well-being, preparedness and support are all essential aspects inpatient programs and should be considered relevant components to any evaluative measure[23].

2.2.1 Study Objective

The primary aim of this study is to explore the perceptions of stakeholders involved in a child and adolescent psychiatric inpatient unit. In doing so, the issues and challenges commonly faced by parents of youth undergoing psychiatric inpatient treatment, as well as those experienced by the service providers, was analyzed. Through an exploration into the perceptions of caregivers and service providers in this context, researchers aimed to develop a better understanding the factors associated with successful treatment outcomes.

2.3 Methods

2.3.1 Ethics and Recruitment

Research participants for this study were recruited from a child and adolescent inpatient treatment program located in Edmonton, Alberta. In compliance with Canadian Tri-Council ethics requirements, all subjects were required to give formal written consent prior to participation and the reporting of results of their interviews. The study was approved by the Health Research Ethics Board of the University of Alberta (PRO: 00065662).

2.3.2 Study Design

This research study used exploratory qualitative methodology and thematic analysis to acquire insight, knowledge and understanding. Thematic analysis provides a coordinated approach to obtaining, analyzing and presenting data in a way that is meaningful and relevant, and has been shown to be a useful method for conducting qualitative research[24,25]. While individual themes were pulled forward, the relationship between themes were also explored which allowed the findings to be fully analyzed and understood.

This Edmonton inpatient treatment program adopts a medical model with a multidisciplinary team consisting of psychiatrists, nurses, mental health therapists, social workers, occupational therapists, psychologists, and speech and language pathologists in conjunction with on-site specialized teachers from the local school board. Units employ a structured milieu along with a combination of psychotherapy, medication, and family education. The programs operate Sunday to Friday and follow the school calendar, including holiday breaks (e.g., Christmas), with average lengths of stay of 90-120 days. For this study, research participants were recruited from two different stakeholder groups: (1) Caregivers; (2) Inpatient Service Providers

2.3.3 Study Participants

2.3.3.1 Caregivers

As a part of the program design, caregivers of children undergoing treatment are required to attend semi-weekly group discussions known as "Parent Group." Each session is approximately one hour and focuses on topics related to stigma, parental stress, self-care, familial and parental challenges, and open discussion. Parent group is led by two social workers whose aim is to create a safe environment for parents to talk about their grievances and find common cause with individuals facing similar challenges. In total, the parents are asked to attend six sessions.

Two researchers (MJ and MR) attended each session for two separate cohorts of parents. Each cohort consisted of caregivers of children aged 12-17 who were, at the time of the sessions, being treated in the inpatient unit. The researchers informed each participant that a voluntary focus group would be carried out during the final session by the researchers.

2.3.3.2 Inpatient Service Providers

Inpatient programs require a multidisciplinary team to implement the intensive nature of the treatment regimen. Similar to the caregivers, service providers were informed on the nature and reasoning of the research and were asked to volunteer for a focus group in an attempt to gain their insight.

2.3.4 Data Collection

Focus groups were carried out in a private classroom located within the inpatient unit. All members sat collectively around a large table, and the aim of the researchers was to make the discussion feel as informal as possible. All participants provided written consent for the research, information forms and verbal information from the researchers ensured that participants were aware that their voices would be recorded, and the conversations transcribed for subsequent analysis.

In total, three separate groups were interviewed. The first two groups consisted only of caregivers, while the final group consisted of only service providers. Group One involved 6 individuals: two couples (mother and father) and two mothers, representing five children in total. Group Two involved 4 individuals: two couples (mother and father), representing two children in total. Group Three involved 6 individuals (1 male, 5 females)—three administrators, two social workers, and one therapist.

2.3.4.1 Semi-structured Interviews

To stimulate conversation in the focus groups, the following semi-structured interview questions were asked:

Caregiver Semi-Structured Interview

1. How do you define treatment success in the context of your child(ren)?

2. What are some common challenges you face with your child(ren)?

3. What were your expectations prior to admission into the program? Did these changes as the your child(ren) progressed through the program?

4. If you could change one thing about the current program, what would it be?

5. In your mind, what is the best aspect of the program?

6. What is something that you think others may not understand about what you or your child(ren) has gone through?

7. Overall, do you feel satisfied or dissatisfied by the treatment program?

Service Provider Semi-Structured Interview

1. How do you define treatment success in the context of the inpatient program?

2. What are common challenges you face as a youth inpatient service provider?

3. What are the common challenges you see with the effectiveness of the program?

4. What are your general outcome expectations when a child is admitted? Has this changed as you've worked here?

5. Is there any particular patient characteristic(s) that you find predict better or worse outcomes program?

6. If you could change anything about the program, what would it be?

7. In your mind, what is the best aspect of the program?

8. What is something that you think makes this program unique from other youth mental health programs?

2.3.4.2 Data Analysis

Each focus group conversation was digitally recorded and transcribed verbatim. Each research participant was given a pseudonym (e.g., "Parent A etc.) and all names were changed to denote the person in question (e.g., "daughter's name"). Data was then analyzed using thematic analysis.

2.4 Results

Analysis of the transcribed focus group conversations revealed five primary themes related to treatment success and program structure improvements: (1) Youth mental health and well-being; (2) Caregiver mental health and well-being; (3) The health of the caregiver-child dyad; (4) Education, socialization, and occupation; (5) Institutional interactions. Figure 1 schematically represents the way in which the themes are associated with each other.

2.4.1 Youth Mental Health and Well-Being

The first theme consisted of issues related directly to the children and adolescents being treated in the program. Staff and caregivers identified mental and physical health, symptom progression, behavioural regulation, and readiness for treatment as key components in the determination of successful treatment. In fact, patient mindset and attitude towards their own mental health was suggested as one of the most important determinants of success. Some examples of these expectations are shared in the following participant statements:

> *"[Son's name] was initially so worked up about coming here and then realized very quickly that it's a positive atmosphere and he's getting a lot of positive things out of it."* **[C]**

> "*It's about changing the mindset and how you look at things, right? … A lot of people come in thinking, you know, you're just cured, it's over. But it's about managing and levelling the ups and downs*." **[S]**

"I think engagement is key, too. Like, when the kid turns that corner and they're able to engage in the treatment process and be able to work with us, identifying the goals they want to work on." **[S]**

Many of the caregivers' concerns were related to transitioning from inpatient treatment back to the community. They felt that many of their children had experienced positive gains from treatment but were concerned that their child would relapse or regress when they were no longer in a structured environment. The sudden change from intensive treatment to no treatment at all was identified as a significant missing piece or challenge in the program design, as shown by these statements:

"I mean, I think that everything that's happening today has been really positive, and, you know, he's changing internally a bit, but it's the long term. What happens next?" **[C]**

"It's about what happens after? How do we maintain what he's learning here because if it's not front of mind and central all the time, you don't use it you lose it, right? So I'm concerned about the next phases." **[C]**

2.4.2 Caregiver Mental Health and Well-Being

The second theme includes statements pertaining to the quality of life, stress level, and the mental health of the caregivers. Since the attitudes the caregivers have about treatment are often mirrored by their children, the staff stressed the importance of caregiver mindset and readiness for positive outcomes, as exemplified by these statements:

"It's with the families and the kids that don't really engage that you don't see success. You don't see, like, the changes that are happening that you hope for. More so than the ones that do fully embrace the program and work with us." **[S]**

"I was very upset with [son's name] coming here, right? And I said I understand how he feels and now you're just going to go and just throw him to somebody else and I'm like 'nah'.

> *Anyway, now that we've been here for this long, I'm amazed by it. It was one of the best decisions we made was having him here."* **[C]**

Many of the caregivers expressed how worn down they had become. This was primarily a result of constantly looking for answers and not finding solutions to their child's problem(s). They identified the respite the program afforded them, particularly knowing that their child was in a safe and stable environment.

> *"All of a sudden a load is lifted because you worry about your child all the time, but when she's in this program, I don't worry about her and it gives me time to do all the things I'm supposed to be doing because you fall way behind on all your stuff when all you do is worry about your child."* **[C]**

> *"It definitely has allowed us to, like, be able to breathe a little bit and know that he's safe. We know that he's being taken care of, and know that he's being fed and spoken to, and developing relationships, and that we can breathe."* **[C]**

One caregiver in particular identified the effect stigma and blame had on their ability to cope with their child's mental illness, quoted here:

> *"Blame comes from a lot of other people…when they don't understand what's going on. And we didn't understand it enough really to explain to people. But you will get people who will say to you: 'Did you take drugs? Were you an alcoholic? What did you do to have your child turn out this way?' And, you know, I didn't drink, I didn't smoke, I didn't do drugs, I tried to do whatever I could when I knew I had a child on the way, and I don't know why he's different than our cookie-cutter model, but he is."* **[C]**

2.4.3 The Caregiver-Child Dyad

The strength of the child-caregiver dyad was identified as an essential component to consider in any evaluation of youth psychiatric outcomes. Staff noted that caregiver engagement and education are essential pieces to youth therapy because they encourage a stronger bond between the child and caregiver, and they give families the necessary tools for maintenance and management after discharge.

"I want to see [daughter's name] develop the confidence that she has the tools and she can deal with things when they come up. But also that we are there for her and that she knows [negative symptoms] are going to come up when she feels this way and she knows how we can all deal with it together." **[C]**

Health care providers see first-hand the impact that environments has on youth with mental health challenges and shared these concerns:

"*It would be great to have family therapists working on board, because we can do so much with these kids, get them to, you know, make some really positive changes. But if they're going back to the same environment that hasn't changed or supported that kid's treatment, that kid's going to show up in the system again in another program, right? Or coming back to us which we have seen, too. So that's one thing I think is the limitations of our programming is that we don't have enough family support."* **[S]**

A major concern parents expressed was their inability to trust their child on their own. Many parents expressed fear and concerns about the safety of their child and the way their child's mental health can permeate into their physical health. This caused concerns about safety particularly for those with children who had previously displayed self-harm, suicidal ideation and/or suicidal behavior. The following participants statement illustrate these fears and concerns:

"Safety is my major concern. I will measure success as if she is safe by herself at home." **[C]**

"But that's the thing is I don't know if they don't get a second chance to think about [not harming themselves], they won't." **[C]**

“*The last [suicide attempt] was the third time for our daughter. Once last year, and then twice at the same time the year before.”* **[C]**

2.4.4 Education, Socialization, & Occupation

The fourth theme relates to academic performance, peer relationships, social functioning, and vocational success. One caregiver expressed concern over how their child was going to be able to build and maintain relationships in the future:

“[Daughter’s name] has managed to keep her friends from school, but she says now that she’s been away from them for so long, she feels like she’s, I don’t know, like she’s sort of out of the loop and she’s worried about losing their friendship.” **[C]**

Almost all stakeholders voiced their concerns about “the coming next phase.” Observing noticeable behavioural and cognitive improvements during treatment is an essential outcome in assessing any treatment program; however, there was major concern that not enough emphasis is currently being placed on the importance of the long-term maintenance and management and the practical application of these skills after discharge.

“You’re going to throw him back into the regular population and the schools that aren’t ready for, or not necessarily equipped to deal with, children who are of a higher need.” **[C]**

“Everyone just thinks short-term. It’s school now, but then it’s getting a job, getting into society. How are they going to make their way?” **[S]**

Many caregivers noted the positive effects healthy peer and adult socialization within the inpatient setting had on their child. Service providers reiterated this sentiment, suggesting that the inclusive environment promoted by the program inherently induces positive effects.

"Because [son's name] has never socially been really accepted and he is being more accepted here with, you know, different peer groups, right? The staff are treating him with the respect that he doesn't necessarily get elsewhere even though he behaves, you know, kind of poorly in that moment." **[C]**

"You're inclusive of other people, they're helping you with your mental health, they're providing you with those social skills, and they're getting respect playing games and time together." **[S]**

2.4.5 Institutional Interactions

The final theme identified relates to the structure of the child and adolescent mental health system, including the most prominent issues, suggestions for improvements, and what is currently seen as working well. Many of the parents expressed grievances over service access. They indicated that they had very little understanding of the steps involved in finding appropriate treatment and gaining access to those services when identified, as expressed in this quote:

"There's just not enough resources out there. Somebody to point you in the right direction, or there's nobody with you along the way saying, 'okay, go here.' You wait for an appointment just to find that out." **[C]**

Waitlist length was implicated a number of times as a major issue with the current system. Caregivers noted that a child's threshold for access was far too high—with self-harm or suicidal ideation/attempt being requisites for admission to treatment.

"What is bad enough? Because we took her to emergency because she was cutting herself and bleeding like a stuck pig, but because she didn't actually try and kill herself, she was just hurting herself, that wasn't considered bad enough, right?" **[C]**

"Because there is a huge waitlist, I think our responsibility is to be meeting the needs of the most in need as best we can…because we realize that there are finite resources and there's a long

> *waitlist, it's important to find out what's going to be the most effective treatment with the resources that we have."* **[S]**

Service providers indicated that the lack of a "waitlist gatekeeper" made it very difficult to triage the individuals who are best suited for inpatient treatment. This has further implications for the effect of the milieu in therapy, as suggested by this service provider:

> *"I think one thing with the intake that we try to do to support the program more is understanding that there's a milieu therapy, that the therapeutic milieu is a big part of it, but then there's individual things where they work with the kids. So the milieu provides the kids with a supportive environment where they can feel good about themselves and have hope."* **[S]**

2.5 Discussion

The purpose of this study was to delineate the perceptions of stakeholders towards a child and adolescent psychiatric inpatient unit. The qualitative findings of this analysis revealed five primary themes identified by caregivers and service provides as essential metrics in assessing treatment efficacy and service utilization.

2.5.1 Youth Mental Health & Well-Being

Service providers stressed the importance of patient readiness as an essential component to developing a mindset amenable for treatment. The literature supports the assertion that mindfulness, readiness, and motivation are major predictors of positive outcomes in youth psychiatric patients[26,27]. Depressed adolescents who are more mindful of their symptoms are more likely to seek primary care for their mental illness[28]. In a study comparing readiness and depression scores in adolescents undergoing a variety of psychiatric interventions for their depression, Lewis et al. (2009)[29] found that, regardless of the treatment type, readiness at baseline predicted positive response to treatment.

A major concern identified by caregivers was the lack of available transition programs and the potential negative effect a lack of follow-up may have on any improvements their child attained from treatment. Transition from treatment programs back to the community can be a difficult process—this is particularly true for inpatient treatment, which is both intensive and extensive[31,32]. Adolescents undergoing inpatient treatment are often concerned about the stigma of requiring such treatment, the lack of continuity between the inpatient setting and the outside world, and the difficulties in transitioning from an intensive setting to the community[32,33]. Poor transition out of inpatient care can lead to recurrence of symptoms and increases the risk of readmission[15]. Considering waitlist times for treatment are already too long, the healthcare system can ill afford a high readmission rate. As such, the implementation of a well-designed transition program for youth psychiatric inpatients will prospectively lessen the burden on the healthcare system at large. Despite transition services being the most common supportive service offered by Alberta Health Services (AHS)[10], the need for further research and development of these programs is still required.

2.5.2 Caregiver Mental Health and Well-Being

A common misconception with mental illness is that the impact is isolated to the afflicted individual. In a child and adolescent psychiatric context, this is particularly erroneous. Caregiver mental health and well-being are highly linked to that of the child and vice versa[22]. In this study, caregivers noted the significance of the respite inpatient treatment afforded them. Self-care was identified as something the parents recognized was important, but very often neglected. This is significant because recent research has shown that parental stress levels are highly correlated with child symptom severity, treatment intensification, and psychiatric outcomes[34,35]. In order for treatment to be truly effective, the skills and tools learned in treatment need to be maintained and managed. Parental psychoeducation has been shown to improve treatment outcomes by developing a rudimentary understanding of mental illness and helping to enhance mindfulness[36]. A recent study looking at the outcomes of a mindfulness course designed for parents being treated secondarily for their child's psychopathology found widespread mental health improvements in both parent and the child, as well as decreased parental stress[37]. These findings suggest that implementing a supplementary psychoeducation-based program for caregivers could have compounding positive effects.

Stigma and judgement were common issues that caregivers identified. Stigma, which relates to the misguided or ill-informed attitudes and behaviours an individual has towards a particular circumstance, can come in two forms: (1) *internal/self-stigmatization* - relating to shame felt by the affected individual; or (2) *external stigmatization* - the unfair attitudes and beliefs others have of the affected individual[38]. In this context, caregivers expressed struggling with both forms of stigma—feeling responsible for their child's mental illness and/or feeling unfairly judged by extended family, friends, co-workers, and peers. Many parents experienced difficulties explaining their child's mental illness to others, and often felt misunderstood. This is significant considering stigmatization can be a major obstruction to service access and the desire to seek treatment[39]. It should be noted that there is evidence that psychoeducation and mindfulness can induce self-stigmatization and shame in the caregivers[40]. Considering this, psychoeducation programs that combine mindfulness and cognitive behavioral therapy may induce positive outcomes while minimizing the risk of caregiver self-stigmatization.

2.5.3 The Caregiver-Child Dyad

The caregiver-child dyad is the most important relationship in a child's development[41]. The caregiver's role is to provide the child with the guidance necessary to facilitate proper cognitive and emotional development. Despite this, family and parent engagement in the treatment process continues to be a patent challenge for mental healthcare providers[42]. Children who have had improper cognitive development as a result of negative or absent parenting are more likely to lack the cognitive tools and attitudes necessary for treatment engagement and success[43,44]. If a child returns to a stressful environment after treatment, the environment may counteract the positive gains made through therapy and induce symptom relapse in the child. It has been shown that children and adolescents with familial risk factors—such as familial stress and low family functioning—are less likely to benefit from inpatient treatment[45]. There is substantial evidence that Adverse Childhood Experiences (ACE) are linked to a number of mental and physical illnesses[46,47]. If these ACE were experienced at home, it is likely that many reminders of the event(s) responsible for the original onset of the child's psychopathology are present in the child's daily environment.

Trust is a vital component to the success of any relationship, and the inability to formulate trust in many children was identified by service providers as a major impediment in the healthy dyadic relationship. A common struggle reported by caregivers was the consistent fear that the child may harm themselves or attempt/commit suicide. As youth with mental illness are more likely to experience suicidal ideation and attempt[48], one of the key challenges parents faced was figuring out how to cope caring for a child who has a propensity for self-harm. Increased resources towards transition and follow-up services, coupled with investment into preventative measures, could help alleviate some of these longstanding worries.

2.5.4 Education, Socialization, & Occupation

Caregivers identified educational success, sociability, and long-term outcomes as significant concerns. Strong interpersonal relationships have been identified as a major mediating factor in the onset of youth mental illness[49] and as a predictive component of treatment outcomes[50]. It's been suggested that the traditional medical model fails to account for the impact of psychosocial factors on progression of youth mental illness[51]. In a study done by Setoya et al. (2011)[52], youth psychiatric inpatients identified improving interpersonal relationships and sociability as the primary aim of treatment.

One of the key components of any inpatient program is the temporary isolation of the individual from the "real world." In one sense, this is useful because it creates a safe and structured environment for the patient that is meant to be amenable to positive changes; however, the temporary isolation can create a gap between patient and community[21,53]. Interviews with adolescent psychiatric inpatients has often revealed that individuals felt constricted in an institutional, hospital-like setting, and disconnected from the outside world[54]. However, many caregivers noted the positive effects of positive peer relationships and adult socialization that occurred within the inpatient setting; current research has noted the importance of positive social relationships in inpatient program outcomes[32]. In these settings, individuals have the opportunity to meet other youth with similar afflictions as their own which may help them to feel more included and less marginalized. Furthermore, youth see the important differences in their peers and learn to be empathetic and accepting of others; this often extends to other activities as well such as recreational activities and team sports that help build leadership and communication skills[55].

2.5.4 Institutional Interactions

Both caregivers and service providers acknowledged some of the underlying issues with the current child and adolescent psychiatric inpatient system. Access to services was a theme particularly emphasized in all of the discussions. Help-seeking and decision-making models for children and adolescents differs from those for adults in that they heavily rely on external factors, particularly caregiver behavior, attitude, and communication[56]. That is, youth with mental health concerns are much less likely to seek out their own treatment and generally rely on family members, teachers, health professionals, and/or community members to initiate the referral process. In a review of parental mental health services utilization, Logan and King (2006)[58] developed the framework for "parentally mediated service-seeking," which emphasizes the importance of developing a process-oriented framework that can be easily utilized by caregivers looking for services.

Perhaps the most common grievance for caregivers was their concern over the waitlist times. Most expressed concern that the waitlist was too long and that the qualifications required to access inpatient or intensive services was too severe. Computer-assisted practices, such as electronic assessments, psychoeducation modules, or online cognitive behavioural therapy (CBT) could help ameliorate the struggles faced by families waiting for service access, while simultaneously lowering the burden on the mental healthcare system[58,59]. In Alberta, online technologies were traditionally underutilized, with roughly 2% of AHS direct programs reporting that they use the internet for screening, assessment, treatment, support, and/or post-treatment follow-up[10]. The COVID-19 pandemic has significantly increased the need for remote interaction, which has revealed the utility of remote therapy via phone, video chat, or mobile applications[60,61]. With the technology and methodology increasingly improving, it is essential that CAMHS continue to adopt a modern approach to manage these challenges.

Service providers identified the therapeutic milieu as one of the major strengths of the program. The milieu refers both to the environment and setting of the treatment program, as well as the make-up of the people, both staff and patients, involved[55]. A harmonious balance of staff with differing skillsets, as well as patients with the right blend of diagnoses and behavioural tendencies, will draw the largest benefit from milieu therapy[62]. One of the strengths of inpatient therapy is that it often involves an interdisciplinary approach, providing a combination of therapies[31]. The staff pointed out that without a waitlist "gatekeeper," there is less control over the patient make-up, dampening the potential positive impact of the milieu. Primary care providers who are best suited to act as these "gatekeepers" should be utilized in order control the portal of entry and effectively triage individuals to where they will receive the best possible benefit[17,63].

2.5.6 Limitations

There are a number of limitations to this analysis which restrict the strength of the findings. Firstly, the analysis was carried out on a small number of individuals and did not represent all the stakeholders engaged with the program. Future research should aim to gather information from a variety of stakeholders, including but not limited to caregivers and immediate family, extended family, service providers, healthcare professionals, psychiatric experts, teachers and counsellors, and community members. Second, this was analysis was carried out at a single youth psychiatric inpatient unit; future research should obtain information from inpatient unit in different geographical regions and jurisdictions for comparison. Finally, this was a qualitative assessment and contained no quantitative data. A more in-depth analysis could use quantitative information to supplement any qualitative findings to improve the rigour of the analysis.

2.5.7 Conclusions and Future Research

Child and adolescent mental illness have quickly become one of the largest burdens on the health care system. With the ever-increasing prevalence of youth diagnosed with a psychiatric illness, it has become imperative for treatment options to be as efficient and effective as possible. In order to achieve this goal, a consensus on assessment characteristics must be achieved. In this study, we assessed the perceptions of stakeholders involved in a youth psychiatric inpatient unit in order to parse out these characteristics. Both staff and parents noted the diverse factors associated with determining outcomes, which indicates that current measures used in this setting may exclude important data necessary for a thorough assessment of treatment effects. Going forward, CAMHS research should work towards the development of a "balanced scorecard" outcome measure, which would contain robust multivariate information to account for the abundance of different metrics relating to mental health and well-being. This analysis provided a preliminary framework for identifying these factors.

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2.7 Additional Information

2.7.1 Declaration of Interest

The author(s) declare no potential conflicts of interest with respect to research, authorship, or publication of this article.

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2.7.4 Author Contributions

All authors made significant intellectual contributions to this manuscript. Research methods and study design were developed by M.R. and M.J. with assistance from A.G. Focus group interviews were conducted by M.R. and M.J. Transcription of interviews was independently completed by M.R. and M.J., and thematic analysis of the findings was done collaboratively. A.G. gave final recommendations on the qualitative findings and manuscript composition.

2.8 Implications of results and rationale for further investigation

For the purposes of this dissertation, the findings of Chapter 2 provide the rationale for subsequent chapters. Based on the recommendations and suggestions noted by caregivers and service providers, the treatment program under consideration will be an episodic and complex multimodal treatment program specifically designed for youth survivors of child sexual abuse—the Be Brave Ranch (BBR). The rationale for selecting this program for the implementation of outcome assessment is as follows:

1. Caregivers of the focus groups identified the significant impact of stigma, both for themselves and their children. Some of the effects of stigma can be reduced by replacing the institutional setting of an inpatient hospital unit with a camp-like setting; this may remove the feeling a child or adolescent may have about being "different" or "abnormal" when confined to a hospital setting and alleviate the feelings some patients felt about feeling siloed from the outside world. Second, caregivers of sexually abused children may experience stigma through shame or embarrassment, often dealing with feelings of guilt for not protecting their child from the abuse. Caregivers of sexually abused children may benefit from the interaction of individuals who have had similar experiences, and the knowledge that they are not alone in the challenges they have endured.

2. Participants discussed the benefits of intensive inpatient treatment and the structure it provides for patients. Intensive treatment allows for more complex forms of therapy to be conducted and helps sustain positive outcomes. For the caregivers, intensive treatment provides a respite from their child while giving them with the assurance that their child is in a safe place. The Be Brave Ranch consists of four intensive treatment rounds spaced out over the course of one year. The episodic structure of the program provides the benefit of intensive treatment without the necessity for an extended length of stay.

3. Service providers noted the importance of the therapeutic milieu in determining treatment outcomes. The Be Brave Ranch controls for the milieu in a number of ways. First, there are two programs separated by age—a child program for kids aged 8-12 and an adolescent

> program for teens aged 13-17. Cohorts are limited to groups of 4-7 individuals to promote group cohesion and are controlled for gender. The treatment program is multimodal in design which further enhances the therapeutic milieu by employing a variety of treatment options (e.g., cognitive behavioural therapy (CBT), yoga therapy, mindfulness training, eye movement desensitization and reprocessing (EMDR), recreational/play therapy, animal-assisted therapy, etc.). Perhaps most significantly, every participant in the program has experienced early-life trauma in the form of child sexual abuse. The common ACE shared by these participants allows therapists to focus on trauma-informed practice and tailor treatment to the specific adverse childhood experiences of this population.

Investigating treatment impacts on a population with early-life trauma is particularly important considering the strong link between adverse childhood experiences and early-onset mental illness. In order to elucidate a better picture of the population under investigation, Chapter 3 explores the level of early-life adversity for children and adolescents admitted into this program, as well as for their caregivers. Chapters 4-6 investigate treatment success using a variety of standardized outcome assessment tools.

Chapter 3: Rates of adverse child experiences (ACEs) in youth survivors of child sexual abuse (CSA) and their biological caregivers

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3.1 Abstract

Background: It is well recognized that Adverse Childhood Experiences (ACEs) and developmental trauma are associated with poorer long-term mental health outcomes. Child Sexual Abuse (CSA) is a frequent ACE, which requires specific trauma-focused therapies to help treat impacted individuals. Current evidence suggests that even those with extensive negative experiences can be helped by a variety of interventions such as improving relational caregiving, while poor caregiving may exacerbate subsequent problems. Therefore, it is reasonable that caregivers who themselves have high ACE scores may adversely affect the development of their affected children.

Study Objective: The present analysis examines the relationship between biological caregivers of CSA survivors and their children, in terms of history of ACEs. Secondarily, we aim to determine whether this population (both caregivers and children) are more likely to have higher ACE scores than the standard population. Finally, we wanted to examine carefully the level and distribution of ACE scores for youth CSA survivors.

Materials and Methods: Children and adolescent CSA survivors aged 8-17 who were enrolled into a multimodal treatment program for their abuse completed the 18-item Center for Youth Wellness ACE questionnaire (CYW ACE-Q). One biological caregiver of each child was asked to complete the original 10-item ACE questionnaire (ACE-Q). Scores were statistically compared to determine if caregiver ACE score was associated with their child's ACE score. Secondarily, the distribution of scores were compared to the 2013 Alberta ACE survey to determine if this population statistically differed from the Alberta reported average.

Results: A moderate correlation was found between caregiver and child ACE scores ($r[90] = 0.44$, $p < 0.0001$). Compared to the standard population, ACE scores were significantly higher in both CSA survivors and their caregivers (Median ACE score for CSA participants was 6, caregivers 5.5, and for the Alberta survey sample 1). Statistical differences were found between both the CSA survivor group and the Alberta sample ($p<0.0001$), and the caregiver group and the Alberta sample

(p<0.0001). We also found that a high proportion of caregivers had themselves been victims of CSA.

Conclusions: ACE scores in both the young survivors of CSA as well as their biological parents are much higher than what is commonly seen in a normal population. These results support the need for trauma-informed approaches when working with sexual abuse survivors, as individuals have most likely experienced many other kinds of trauma beyond that abuse. They also underscore the importance of considering family systems, parental histories, in addition to the trauma narrative of the child who is in a treatment program. The findings of this study suggest that a family-centered, trauma-informed care approach should be considered, rather than just programming for the impacted child. This would require changes in both policy and practice when dealing with developmental trauma such as sexual abuse.

Keywords: Adverse childhood experiences; child sexual abuse; children's mental health; adolescent mental health; developmental trauma; mental health treatment; policy

3.2 Introduction

Brain development is a process that begins shortly after conception and continues into early adulthood[1]. Toxic stress—when a child experiences strong, frequent, and/or prolonged adversity without adequate adult support—can impair brain development and increase the risk for stress-related disease and cognitive impairment[2,3]. Research on the biology of stress has identified that early lifetime adversity can impair a developing brain and its architecture[4,5].

Adverse Childhood Experiences (ACEs) are defined as traumatizing events that occur before the age of 18. ACEs are generally assessed using the ACE questionnaire (ACE-Q), which measures an individual's exposure to toxic stress experiences from birth to 18 years of age. ACEs have been consistently associated with a variety of negative psychiatric outcomes, including early onset mental illness and cognitive deficits[6-8]. The seminal ACE Study[9] examined the connection between early-life adversity and long-term health outcomes in 18,000 adults and showed that a higher level of exposure to early life stress had a clear, dose-response relationship to an individual's likelihood of developing physical, behavioral, and social problems in adulthood, as well as a higher likelihood of future victimization. Subsequent studies have shown that higher ACE scores are associated with a variety of mental health issues, including depression, anxiety, substance abuse, suicidal ideation, and addiction[10-13], and can also impact parent-child relationships and healthy attachments[14-16].

Child Sexual Abuse (CSA) is a common ACE, and studies from the United States suggest approximately 8% of men and 16% of women have experienced at least one incident[17,18]. Rates of CSA in Canada are comparable, with an estimated 10% for males and 20% for females[19,20]. However, considering a significant number of CSA incidents go unreported to the proper authorities, these estimates undoubtedly understate the severity of the problem[21]. Of further consequence, there is evidence suggesting that there are particularly sensitive periods in childhood in which the deleterious effects of CSA can be amplified[22,23]. Fortunately, research on resilience has shown that providing stable, responsive, nurturing relationships in the earliest years of life can prevent or even reverse the damaging effects of early life stress, with lifelong benefits for learning, behavior, and health[24-26].

Recent developments have begun to shed some light on the biological mechanisms involved in mediating traumatic experiences via physiological changes, some of which may involve epigenetic inheritance. It has been well established that the effects of early-life stress on one individual can be passed down to subsequent generations[27-29]. In Canada, this is of particular significance to Indigenous populations. Bombay et al.[30] found greater depressive symptoms in the offspring of individuals who had attended the Indian Residential Schools. Further research in these populations has shown this is particularly true children whose parents have elevated incidences of alcoholism, suicide, and early death[31]. Recent research has suggested that the effects of childhood trauma may be transmitted to subsequent generations; in fact, a caregiver's own unresolved trauma increases the risk that their child(ren) may be exposed to adverse events[27]. Thus, using epigenetic markers, Yehuda et al.[32] found an increase in methylation in the functional region of the FKBP5 gene in the children of Holocaust survivors. The FKBP5 gene plays an important role in the regulation of the Hypothalamic-Pituitary-Adrenal (HPA) axis—a key pathway in stress regulation—and can be effectively disrupted through epigenetic modifications, such as methylation. Similarly, Yang and co-workers found altered methylation patterns at numerous sites for a group of maltreated children who were removed from their parents, compared to a group of age-matched controls[33]. Additionally, aside from genetic factors, caregivers may also transmit their unresolved trauma histories to their children via behavioural means, such as increased anxiety, unwillingness to allow developmentally appropriate behaviours such as exploration, and overreaction to hearing about their child's negative experiences. For these reasons, a better understanding of the transgenerational effects of ACEs on mental health may help to develop preventative measures and alleviate these widespread problems

By comparing ACE data from both CSA victims and their biological caregivers, it may be possible to gain a greater understanding of these relationships as well as determine best practices relating to generational trauma(s). Data was collected at the Be Brave Ranch (BBR), a treatment facility designed to treat youth CSA survivors[34,35]. As part of their regular intake activities, the BBR routinely evaluates the role of multi-generational ACE scores. Using data collected at this facility it is possible to compare ACE scores from both the patient and caregiver groups.

3.2.1 Study Objectives

The aim of this study was to determine if there is an association between the ACE scores of child sexual abuse (CSA) survivors and those of their biological caregivers. Secondarily, we aimed to assess whether CSA survivors and their biological caregivers reported more significant ACE histories as compared to the general population.

3.3 Materials and Methods

3.3.1 Study Design

Here we present results from a cross-sectional analysis involving secondary use of de-identified data collected during routine admission to the Be Brave Ranch (BBR) program. Ethics approval was obtained from the University of Alberta for this secondary use of the data (HREB ID Pro00089614).

The treatment program was carried out in an independent episodic trauma-focused facility specifically designed to treat child and youth CSA survivors aged 8-17. Upon admission into the program, participants and caregivers are routinely administered a number of questionnaires which are used to guide individual treatment, and to evaluate the efficacy of the program. To measure history of early-life trauma, caregivers are administered the ACE Questionnaire (ACE-Q), a 10-question self-report survey designed to measure an individual's history of early-life adversity. Additionally, caregivers of children under the age of 13 were asked to complete the ACE questionnaire on behalf of their child. Each question is a yes/no variable that asks about the individual's history of abuse, neglect, and household dysfunction. For the youth CSA survivors participating in the program, ACE history was measured using the Center for Youth Wellness ACE-Questionnaire (CYW ACE-Q). The CYW ACE-Q is not considered a validated diagnostic tool; however, it has been shown to be an effective tool for measuring exposure to adversity in adolescents[36]. The CYW ACE-Q is an 18-question survey that asks binary "yes/no" questions pertaining to a variety of common adverse events experienced by youth, including the standard 10

ACE items. Scores with an answer of “yes” are given 1 point and the total is summed. As such, higher scores indicate more ACEs experienced by the individual. A CYW ACE-Q score of >4 combined with symptomatology is generally considered an indicator for treatment referral[37]. Moreover, previous research has suggested that ACE scores are dependable, showing good to excellent test-retest reliability over time[38].

3.3.2 Statistical Analysis

Regression analysis was used to compare child and caregiver ACE scores. A correlation coefficient of $r > 0.5$ was considered strong, $0.3 < r < 0.5$ moderate, and $r < 0.3$ weak[39]. To compare the distribution of ACE scores in our population against a comparison group, the 2013 Alberta ACE Survey[40] was used as a comparison group. This survey, conducted by the Alberta Centre for Child, Family and Community Research, issued telephone interviews to 1200 Albertan adults in order to collect a sample estimate of the prevalence of ACEs in the Albertan population. From the 1169 respondents who completed the full survey, over a quarter (27.2%) reported at least 1 ACE. To our knowledge, no Canadian data regarding the prevalence of ACEs in youth, as measured by the CYW ACE-Q, currently exists, so a comparison of score distributions with this group was not possible. However, because the section 1 of the CYW ACE-Q is the same as the original ACE questionnaire, the frequency of section 1 score distribution was plotted and compared against the same sample. Non-parametric Mann-Whitney U tests were conducted to test for statistically significant differences between youth, caregivers, and the Alberta sample. Statistical significance was considered at $p<0.05$.

3.4 Results

3.4.1 Demographics

Demographic information for the CSA treatment participants and their caregivers is summarized in Table 1. Ninety child-caregiver pairs were available for analysis. The average age of the CSA survivors was 12.4 ± 7.4 years with an age range of 8-17; for the caregivers, the average age at baseline was 39.0 ± 9.0 years with an age range of 27-62. Seventy-four (82.2%) of the youth CSA survivors were female, while 16 (17.8%) were male[1]. The caregivers consisted of 78 biological mothers (86.7%) and 12 biological fathers (13.3%). Twenty-nine (32.2%) of the participants and 26 (28.9%) of the caregivers identified as an Indigenous Canadian. Of the CSA survivors, 58.9% (53) had been previously treated for a mental illness, and 43 (47.8%) had been pharmacologically medicated for their mental illness; for the caregivers, 61.1% (55) had been previously treated for mental illness and 35 (38.9%) had been pharmacologically medicated. Nearly half (41.1%) of the caregivers reported an average family income of under $30 000/year, and only 14 (15.5%) reported an annual income over $100 000.

Insert **Table 1** here

3.4.2 Nature of the CSA

As part of the intake surveys, caregivers are asked a few questions about their child's sexual abuse. Of the 90 CSA survivors treated in the program, 74 (82.2%) had been sexually abused on multiple occasions. The reported mean age at first traumatic incident was 6.6 ± 3.1 years old. The vast majority of survivors (94.4%) knew their offender prior to the abuse. Sixty-three (70.0%) of abusers were adults, 22 (24.4%) were adolescents, and 5 (5.6%) of offenders were other children.

3.4.3 Distribution of ACE Scores

The distribution of traumatic early-life events experienced by participants and caregivers is summarized in Table 2. As was expected, all youth participants reported having been a victim of sexual abuse; 60% of caregivers reported being sexually abused prior to the age of 18. Outside of sexual abuse, the most common ACE for the CSA participants were experiencing harassment or bullying at school (n=77, 85.6%), living with a mentally ill household member (n=75, 83.3%), being victims of verbal abuse (n=65, 72.2%), and having parents who are separated or divorced

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[1] Because the adolescent program is limited to females for safety reasons, our data necessarily oversamples females

(n=62, 68.9%). For the caregivers, the most commonly reported ACEs were having parents who are separated or divorced (n=70, 77.8%), being a victim of verbal abuse (n=64, 71.1%), living with a mentally ill household member (n=52, 57.8%), and living with a household member with a substance use disorder (n=48, 53.3%).

Insert **Table 2** here

3.4.4 Caregiver ACE Score and Age versus Child ACE Score

Linear regression analysis was used to compare child and caregiver ACE scores. Figure 1 shows the linear regression of child versus caregiver ACE score. This analysis found a statistically significant correlation coefficient of $r(90) = 0.44$, ($p < 0.0001$). Hence, this data supports the possibility that there is likely to be a moderate correlation between ACE scores of children with CSA and their biological parents.

Insert **Figure 1** here

3.4.5 Proportion Analyses

Figure 2 shows box and whisker plots of ACE scores for youth CSA survivors, their biological caregivers, as well as those of the 2013 Alberta ACE survey reference group. As was expected none of the children reported a score of 0, while only one caregiver reported experiencing no ACEs. The median ACE score for the CSA participants on section 1 of the CYW ACE-Q was 6, and a score of 8 was the most frequent reported in the child group with 22 children (24.4%) reporting 8 ACEs. The median caregiver ACE score was 5.5, with a score of 6 (17.8%) being the most common number of ACEs reported. By contrast, in the 2013 Alberta survey, the median ACE score was 1, with 87.9% of participants reporting a score of 3 or lower. Mann Whitney U tests confirmed statistically significant differences between the CSA participant ACE scores and the

Alberta sample ($p<0.001$), as well as between the caregivers and the Alberta sample ($p<0.001$). The difference between the child and caregiver samples was not statistically significant ($p=0.071$).

Insert **Figure 2** here

3.4.6 Principal Component Analysis (PCA)

To further examine the pattern of ACE scores in the patients, a Principal Components Analysis, using Varimax rotation, was performed (Table 3). Varimax rotation maximizes the variance shared among items by increasing the squared correlation of items related to a given factor, while at the same time decreasing correlations to other factors; thus, the loadings are assumed to be orthogonal.

Analysis was limited to the 10 original ACE questionnaire items, less the sexual abuse question which was de facto experienced by everyone in our sample. Three factors were suggested using the Kaiser rule (i.e., with eigenvalues > 1.0). We observed the component loading pattern presented in Table 3. Upon examination, the three factors translated roughly as: *Neglect*, characterized by not having food in the house, a parent who had been incarcerated and/or substance abusing, and verbal abuse; *Domestic Violence*, characterized by physical abuse and/or the witnessing of abuse and feeling unloved; and *Lack of Family Cohesion*, which was marked by a history of divorce or mental illness in the home. Taken together, these three factors explain 53.98% of the variance in the data. Note, however, that the accompanying interpretations for the factors are based upon subjective understanding and could reasonably be interpreted in other ways. These components are illustrated graphically by a biplot of the data, shown in Figure 3.

Insert **Table 3** and **Figure 3** here

3.5 Discussion

The results from the present analysis support our hypothesis that there would be a statistically significant correlation between child sexual abuse (CSA) survivor ACE scores and those of their biological caregivers. We believe the observed correlation emphasize the need for further research regarding the reasons for this possible link. Further to this, we found that the number of ACEs reported by both caregivers and their children were significantly higher than the surveyed general population. These findings indicate that the risk for ACE may be higher in children whose parents have a significant history of early-life trauma. Specifically, the high prevalence of these ACE in this population supports the notion that CSA survivors are 2-3 times more likely to experience all other ACE as compared to those with no history of CSA[41].

3.5.1 Distribution of ACE Scores and Implications

Current research on the prevalence of ACEs has shown that individual's whose immediate family members have had early-life trauma are more likely to face childhood adversity themselves[42]. When comparing both the child and caregiver ACE score distributions to the standard population, we found significantly higher overall scores for both the victims of CSA and their caregivers. Because all of the children admitted to the program have been victims of sexual abuse, and because sexual abuse is one of the ACEs included in the ACE-Q, *a priori* none of them could have a CYW ACE-Q score of zero. An unexpected finding from our analysis was the high proportion of caregivers who had themselves been victims of CSA. Furthermore, only one parent reported an ACE of 0, and the median was over 5. Similarly, the children/youth in the program exhibited ACE scores over 6. In other words, both the caregivers and the patients themselves showed scores several times higher than the comparison population of other Albertans, a finding that was quite remarkable in and of itself. A similar recent study of over 200,000 Americans found a mean ACE score of 1.56, further supporting the observed disparity[43]. This highlights the way in which ACEs can disproportionately impact certain populations by making subsequent generations more vulnerable to other ACEs.

These findings emphasize that trauma-informed education for both CSA victims and their caregivers could be a useful addition to trauma-focused family systems intervention and care.

Support for caregivers is important to help them learn to be self-reflective, attachment based, and trauma-informed in their parenting styles, so that intergenerational trauma cycles are not unintentionally passed from caregiver(s) to child(ren). Further, mental health supports should be considered within the context of the family system whenever early childhood trauma and early childhood sexual abuse is identified[44]. This is in contrast to current practice which treats child and parent (or caregiver) separately, usually without support for the family as a whole[45].

3.5.2 Findings of the Principal Component Analysis

The Principal Component Analysis (PCA) conducted in this study revealed three factors associated with a history of CSA: *neglect, domestic violence*, and *lack of family cohesion*. Neglect—which included having endured long periods without food or shelter, having a family member who was incarcerated, and having a family member with a substance use disorder—accounted for the highest explained variance (21%) in the youth surveyed, which may suggest that neglect is a greater risk factor for CSA than other ACE factors. In some sense, this interpretation is reasonable because children who are left to care for themselves may be more likely to encounter difficult situations which they are unsure of how to handle. These findings also call into question the tendency to lump abuse and neglect together, which remains common practice despite evidence suggesting the experiences are very different and result in distinct consequences. As Golden et al (2003) notes, "Most think about abuse and neglect as if they go together. They are linked in our language and legislation as well as in our minds"[46]. Neglect involves a situation in which there is a failure to meet the emotional, physical, and health needs of the child rather than overt acts of violence, making it materially different from abuse.

Interestingly, having a family member with a substance use disorder was strongly associated with both the *neglect* and *lack of family cohesion* components. Substance use disorders may manifest differently depending on the individual and substance(s) being used, and this may explain why this ACE loaded so strongly on two separate components. Although there is some evidence for an increased risk of CSA in children of parents with alcoholism, the relationship is complicated by the identity of the offender—be it the substance abusing parent or someone else[47]. However, children whose parents have a lifetime diagnosis of a substance use disorder are more likely to suffer more severe neglect[48], which as mentioned above may also increase their vulnerability to sexual abuse due to parent absenteeism. Furthermore, children of substance abusive parents with high ACE scores are more likely themselves to suffer from a number of ACEs, highlighting the transgenerational and cyclical transmission of early-life stress and mental illness[13].

The PCA revealed an association between CSA and physical abuse, witnessing household abuse, feeling unloved (*domestic violence* component), and with living with a mentally ill household member, and having divorced or separated parents (*lack of family cohesion* component)—although these were relatively weaker than the neglect component, each accounting for just over 16% of the variance. Differentiating early-life traumatic experiences by subtype may be useful in assisting health professionals to determine which psychopathologies an individual is most susceptible to, based on their trauma history[49]. Understanding patterns of ACE scores likely to be seen in CSA survivors may also offer fruitful suggestions for treatment approaches.

3.5.3 Implications for policy and program development

Trauma-informed developmental care within children's mental health and treatment programming has been defined as best practice[50,51]. This includes, but is not limited to, recognizing consideration of the child's *developmental* age versus *chronological* age, identifying and addressing trauma in its earliest stages wherever possible, and addressing care plans and service delivery based upon mindful reflection of how trauma impacts people's lives, their family system, as well as their unique service needs[52]. These findings emphasize that it may be more appropriate to incorporate dyadic and/or family systems therapy into standard treatment for children with developmental trauma disorder, with a particular eye to potential shared trauma histories. It has become evident that family-centered, trauma-informed approaches with the child as well as their caregiver(s) is necessary and invaluable[53]. As there is a complex interplay between the trauma narratives of both the child and caregiver, how those narratives affect their present can impact their response to therapy. For example, the trauma history of the parent or caregiver may interfere with a child's treatment, via emotional and behavioral strategies that reflect issues with the adults' coping *with* *their own trauma* rather than the current functioning of the child. This family-centered approach necessitates involving a key caregiver in the treatment, recognizing the crucial role of the caregiver in helping to provide a safe environment for the child, and giving them the tools to resolve their own issues. This approach may also delve into the caregiver's history and *their* need for clinical interventions and supports, something which our current healthcare structure does not advocate. In so doing, we recognize the patient as the *family unit* versus any one individual. Therefore, treatment best practice potentially should be delivered by an integrated team who have a broad understanding of how to help both the child victim and their caregiver and/or family.

In this context, the ACE-Q and the CYW ACE-Q are valuable tools for assisting the clinical team in identifying the past narrative context, and how those narratives may influence the present story for both the caregiver and child. Trauma-informed family care and intervention supports the belief that traumatic experiences are relatively common, and that people and families often encounter numerous adverse experiences throughout their lifetime. This assertion is further supported by the growing literature noting the association of parental ACEs as a risk factor for trans-generational childhood adversity[29]. Interestingly, maternal trauma history accounts for up to one-third of the variance in predicting child maltreatment and may therefore be a better predictor of child ACE scores[41]. In working with mental health and addictions therapists, children and families can present with a complex range of symptoms which have not previously been connected with their trauma history[54]. By identifying the ACE scores of both child and caregiver, trauma-informed intervention and treatment can engage with a family-focused approach. Understanding ACE history may enhance caregiver empathy towards their child as they reflect on their own experiences and develop a better connection to their child[55]. Effective programs to support caregiver relationships are key to the successful emotional, social, and cognitive development of children[53]. The results from the present analysis, therefore, demonstrate that the ACE score of adult caregivers may provide helpful information for families and clinicians.

3.5.4 Limitations & Future Directions

There were a few limitations that need to be kept in mind in interpreting our findings. Firstly, there was no direct control group to compare to those in the program or their caregivers. Specifically, it would have been helpful to have data from a non-CSA population, gathered at the same time and using the same methods, to compare directly against. Secondly, ACE scores for caregivers encompass the first 18-years of their lives; as the children in the program had an average age of 12, their scores may not adequately represent a complete ACE history - which makes their elevated scores that much more remarkable. Thirdly, females were overrepresented in our sample, which limits the comparability of the data to the comparison group of Alberta adults, in which there was a nearly even split between genders. Finally, some methodological quirks of the Alberta survey also complicate the comparison. Namely, their team made changes to some items, such as asking about chronic illness rather than physical and emotional neglect; nor did they ask about incarceration. These changes limit the generalizability and comparability of those data to this and other ACE studies. It is also possible that their results reflect an underrepresentation of the true ACE scores of the Alberta population.

This discussion demonstrates the need to look beyond treating child developmental trauma in isolation. Contemporary research on trauma-informed care and leading clinical practices encourages an approach to treat the family system as a whole. There continues to be a significant need to look at risk factors for ACEs in an attempt to mitigate their prevalence. Future research should support identifying resiliency factors alongside the collection of ACE scores. At the same time, improving policy-makers' understanding of the significance of ACEs is imperative to improving awareness and driving effective research. Finally, when working in the area of developmental and generational trauma, encouraging therapists to work from a trauma-informed, family-centered lens is essential.

Future articles should directly examine whether the unresolved parental/caregiver trauma can interfere with the treatment goals of the child, thereby altering the trajectory of healing. Evidence informed outcomes should be measured for child, dyad, family, and funding allocations based on a positive outcomes approach, instead of the current situation where funding is allocated solely based upon the number of individuals treated. By collecting both child and caregiver ACEs, early targeted interventions for children at a high risk for toxic stress, adversity, and disrupted attachments, can be developed.

3.5.5 Conclusion

The key finding from the present analysis is that biological caregivers for victims of childhood sexual abuse (CSA) may themselves have experienced multiple types of trauma in their own childhoods, including CSA. From this standpoint, it is important to recognize that adverse childhood experiences, as they relate to an individual child, cannot be understood in isolation. The interplay between the child, their caregiver(s), and the combined history of adverse events, invokes a necessary conversation for healing and treating developmental trauma. In clinical practice, some protective factors for supporting children and adolescents with their developmental trauma comes within the context of treating the entire family; understanding this highlights the importance of factors that predict resilience.

In many jurisdictions, including Alberta, the mental healthcare system is separate for children and for adults, with little to no integration of the parent-child dyad. Specialized services (such as the Be Brave Ranch) tend to focus on one population (children) due to funding limitations and implications. Yet high correlations in intrafamilial ACEs demonstrate the transmission of trauma and adversity. These results support clinical observations suggesting that there is a relationship between trauma experienced by the parent (and/or caregiver) and that of the child. Our conclusion from this analysis is that the *status quo* in treating childhood developmental trauma needs to shift towards a seamless family system approach. It is believed that this integrated approach would better address the longer-term term negative mental health and addictions symptoms that are tightly associated with childhood abuse.

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3.7 Additional Information

3.7.1 Declaration of Interest

The author(s) declare no potential conflicts of interest with respect to research, authorship, or publication of this article.

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3.7.4 Author Contributions

Research questions, study design and manuscript construction was primarily the work of MR and HP with significant intellectual input from PS, WP, and AG. Data were collected by MR and analyzed statistically by MR and HP. Consultation and expertise were provided by VA, YW, GH, and LS. All authors contributed to the editorial process and approved the final version of this manuscript.

3.8 Tables

3.8.1 TABLE 1. Baseline participant demographics for primary caregivers and for youth child sexual abuse survivors receiving multimodal treatment for their trauma.

		Caregivers (n=90)	**Children & Adolescents (n=90)**
Mean Age (SD)		39.0 (9.0)	12.4 (7.4)
Sex (%)			
	Female	78 (86.7%)	74 (82.2%)
	Male	12 (13.3%)	16 (17.8%)
Identify as Indigenous (%)		26 (28.9%)	29 (32.2%)
Previously treated for mental illness		55 (61.1%)	53 (58.9%)
Previously medicated for mental illness		35 (38.9%)	43 (47.8%)
Annual Income			
	Under $30K	37 (41.1%)	
	$30-50K	18 (20.0%)	
	$50-100K	21 (23.3%)	
	$100-250K	13 (14.4%)	
	Over 250 K	1 (1.1%)	

3.8.2 TABLE 2. Distribution of ACE Scores

ACE Question	Youth (n=90)	Caregivers (n=90)
Parents divorced or separated	62 (68.9%)	70 (77.8%)
Household member incarcerated	29 (32.2%)	26 (28.9%)
Mentally ill household member	67 (74.4%)	52 (57.8%)
Witness household verbal or physical abuse	43 (47.8%)	29 (32.2%)
Victim of verbal abuse	65 (72.2%)	64 (71.1%)
Victim of sexual abuse	90 (100.0%)	54 (60.0%)
Lived without food, clothing, or homeless more than once	20 (22.2%)	27 (30.0%)
Victim of physical abuse	47 (52.2%)	52 (57.8%)
Household member substance abuse	53 (58.9%)	48 (53.3%)
Felt unsupported or unloved	44 (48.9%)	52 (57.8%)
Been in foster care	13 (14.4%)	
Have experienced harassment of bullying	75 (83.3%)	
Have lived with a parent or guardian who died	14 (15.6%)	
Experienced abuse from a romantic partner	15 (16.7%)	
Had a serious medical procedure of life threatening illness	32 (35.6%)	
Have seen or heard violence in the neighbourhood	18 (20.0%)	
Have been detained, arrested, or incarcerated	30 (33.3%)	

Have been abused based on ethnicity, sexual orientation, or religion	28 (20.0%)	

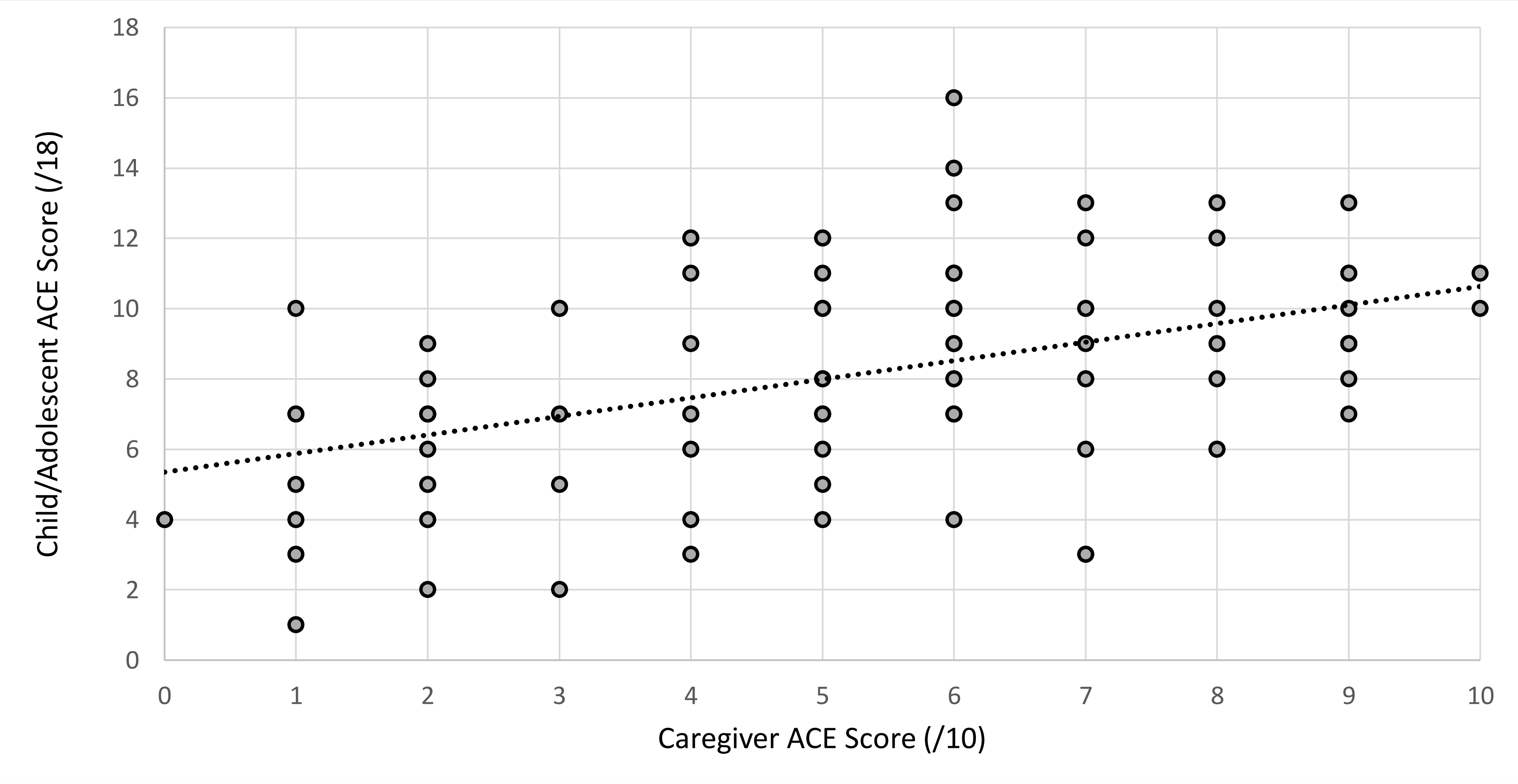
Footnote: Percentages indicate the number of participants who answered “yes” to each of ACE on the CYW ACE-Q for youth child sexual abuse survivors undergoing multimodal treatment for their sexual abuse. Number of caregivers who responded “yes” to each ACE on the original ACE questionnaire are also included

3.8.3 TABLE 3. Results of Principal Component Analysis

Component 1: ***“Neglect”***		**Component 2:** ***“Domestic Violence”***		**Component 3:** ***“Lack of Family Cohesion”***	
Variable	**Loading**	**Variable**	**Loading**	**Variable**	**Loading**
No food	.758	Witness_abuse	-.729	Mentally_ill	.777
Incarceration	.675	Victim_physical	.636	Divorce	.548
Substance_abuse	.580	Felt_unloved	.537	Substance_abuse	.417
Victim_verbal	.502	Victim_verbal	.383	Victim_physical	.390
Felt_unloved	.425	Divorce	-.251	Victim_verbal	.359
Witness_abuse	.233	Substance_abuse	.158	No food	-.203
Victim_physical	.187	Mentally_ill	.157	Witness_abuse	.199
Mentally_ill	.036	Incarceration	-.147	Incarceration	.093
Divorce	-.020	No food	.106	Felt_unloved	-.060
Eigenvalue:	2.439		1.263		1.157
Variance explained (%):	21.017		16.834		16.128
Accumulated variance (%):	21.017		37.860		53.988

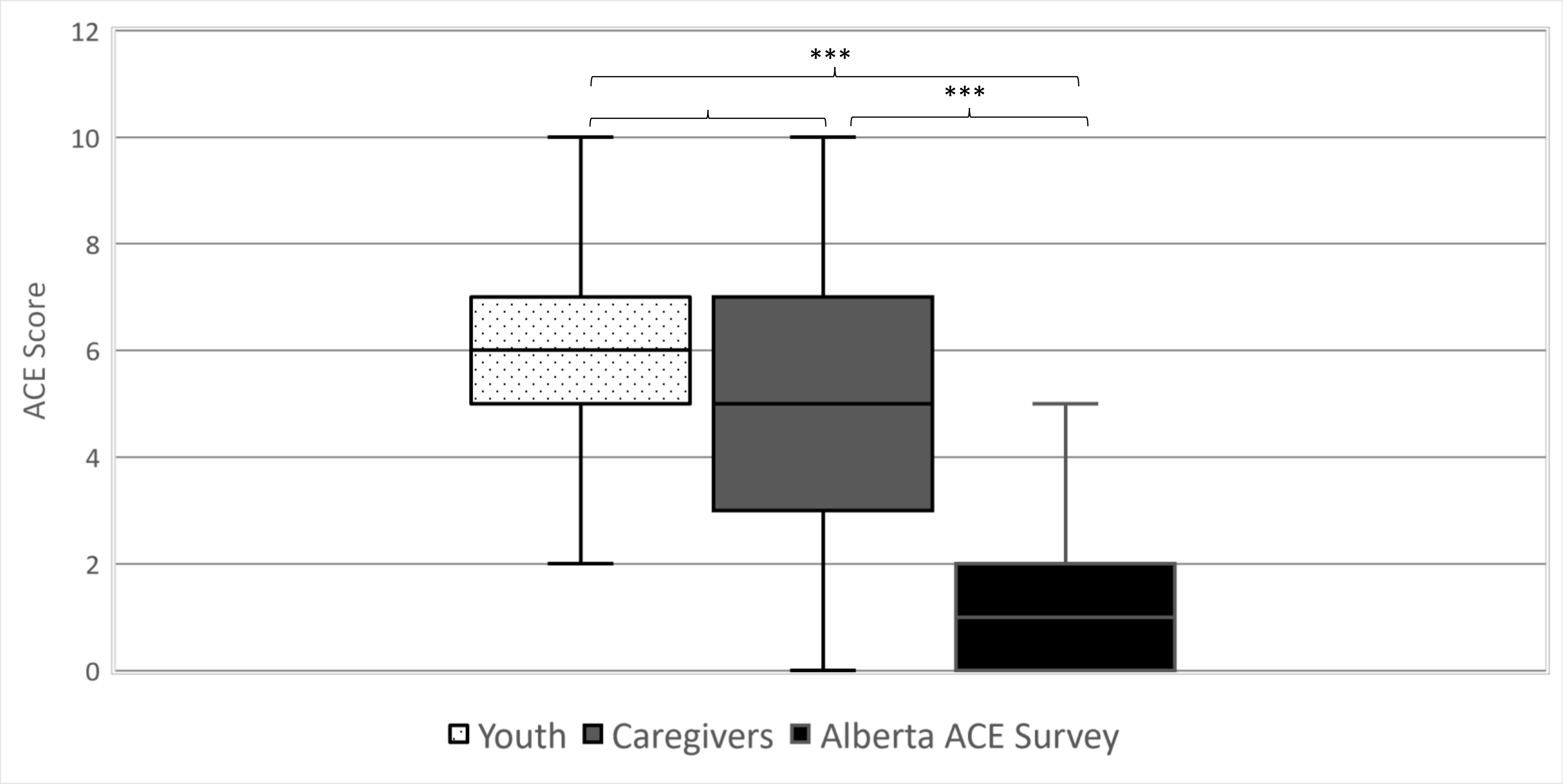
3.9 Figures

3.9.1 FIGURE 1. Linear regression comparing caregiver ACE scores with youth child sexual abuse survivor CYW ACE-Q scores



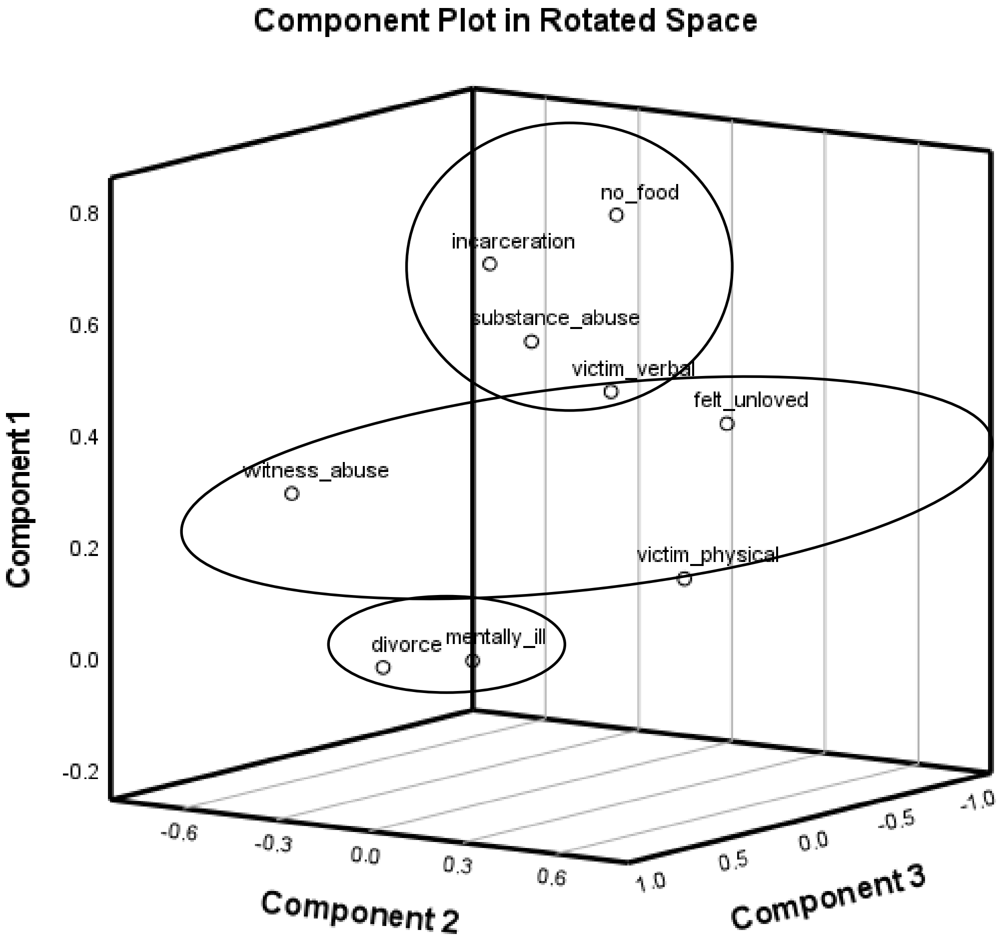
Footnote: The regression has a correlation coefficient of r = 0.44 ($p < 0.0001$), which is considered a moderate correlation.

3.9.2 FIGURE 2. Distribution of ACE questionnaire scores for three groups: (1) Youth CSA survivors undergoing multimodal treatment for their sexual abuse; (2) Biological caregivers of the youth undergoing treatment; (3) Results from the 2013 Alberta ACE survey including 1700 respondents.



Footnote: ***p<0.0001

3.9.3 FIGURE 3. Principal Component Analysis biplot of ACE scores among child and adolescent survivors of Child Sexual Abuse



Chapter 4: Cognitive improvements in child sexual abuse survivors aged 8-12 following a complex multimodal treatment program

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4.1 Abstract

Background: It is well recognized that child sexual abuse (CSA) occurs frequently, with the vast majority of cases never being reported. The impact of such abuse has previously been shown to have both psychological and cognitive impacts that can be long-lasting. However, there is little research regarding any potential improvement in cognitive abilities following treatment.

Study Objective: The aim of this study was to examine cognitive functioning over the course of treatment for CSA survivors undergoing a multimodal treatment program for their abuse.

Methods: Children aged 8-12 underwent multiple intensive interventions located at a dedicated facility (the Be Brave Ranch) during a 12-month period. We examined cognitive changes during this program, as measured by MyCognition Quotient (MyCQ), an online cognitive assessment tool. Cognition was measured in five domains: attention, episodic memory, executive function, working memory, and processing speed. Changes in cognitive performance were analyzed to determine whether statistically significant improvement occurred.

Results: Fifty-four children completed cognitive assessments at both timepoints. The mean baseline MyCQ score was below the age-group standard, but not significantly (48.6th percentile, p=0.36). Over the course of treatment, statistically significant improvements in mean cognitive scores occurred for executive function (13.8% improvement, $p<0.001$), attention (13.5%, $p=0.009$), working memory (7.3%, $p=0.02$), as well as the overall cognitive score (9.1%, $p=0.005$). Episodic memory was the only cognitive domain that decreased over the course of treatment, but this result was not statistically significant (-3.5%, $p=0.47$).

Conclusion: The present results show that cognitive abilities of CSA survivors may improve with multimodal treatment. In general, these improvements mirror the degree of overall clinical improvement. This research adds to the evidence demonstrating that cognitive changes occur following CSA and is among the first to demonstrate possible reversion of such changes in CSA victims following treatment. It also demonstrates that MyCQ is potentially a useful tool to track such changes.

Key words: Cognition; Children; Sexual Abuse; Rating; Treatment; Attention; Memory; Executive Function; Processing Speed

4.2 Introduction

Adverse Childhood Experiences (ACE) encompass a number of potentially traumatic events commonly experienced prior to the age of 18[1,2]. ACEs have been persistently associated with a variety of negative psychiatric outcomes, including early onset mental illness and cognitive deficits[3-6]. Child Sexual Abuse (CSA) is a common ACE with approximately 17% of women and 8% of men experiencing at least one incident of sexual abuse prior to adulthood[7,8]. In Canada, the prevalence of CSA has been estimated at 15.2% for females and 4.8% for males[9,10]; however, rates of disclosure to authorities vary between populations, and it is suggested that many incidents go unreported[11], despite recent evidence has shown that disclosure rates are increasing[12]. CSA is associated with a multitude of long-term negative outcomes, including increased risk for posttraumatic stress disorder (PSTD), mood disorders, substance abuse, self-harm, suicidal ideation and suicide, risky sexual behavior, as well as cognitive and processing deficits[13-16].

To date, limited research examining the effect of ACEs on cognitive impairment has been conducted. Preliminary studies have observed reduced verbal comprehension, executive function, and lower IQs in abused and neglected children[17-19], and there is some evidence that ACEs negatively impact late-life cognition[20], but further investigation is required. To our knowledge, no study has specifically focused on cognitive impairment in youth CSA survivors. However, some studies examining the link between PTSD and cognitive functioning in children have suggested that PTSD could be a risk factor for cognitive impairment[21,22]. With roughly half of CSA survivors meeting the criteria for a PTSD diagnosis, it is reasonable to assert that this population is at high risk for cognitive impairment[23]. Considering the brain is most malleable in early childhood[27], it is imperative that a thorough understanding of the cognitive risk factors involved in CSA be firmly understood. By developing a more comprehensive grasp on the cognitive domains most affected by CSA, better early-intervention and preventative strategies can be developed[13].

Treatment options for CSA survivors are numerous, but there is currently no agreed upon evidence-based best-practice treatment regimen for this population. A review of cognitive behavioural therapy (CBT) interventions for CSA survivors found trauma-focused CBT to be the most effective treatment for CSA survivors[24], but research comparing treatment modalities, as well as those that investigate the impact of combination therapy (e.g., CBT + family therapy) is lacking[25]. Current research aimed at determining the most effective range of approaches to help youth with mental health issues, often following a range of traumatic events, has shown that more intensive multi-modal programs may be the most effective in treating trauma-induced mental illness[26].

4.2.1 Study Objectives

The aim of this study was to assess the impact of a multimodal treatment program on cognitive performance. We hypothesize that, over the course of a 12-month complex, episodic, and multimodal treatment program, participants will show improved performance in each cognitive domain measured. Secondly, given the association between PSTD, CSA, and cognitive impairment, we hypothesized that the mean cognitive performance for these participants would be lower than age standard performance at baseline.

4.3 Materials and Methods

4.3.1 Ethics and recruitment

This study was conducted as part of an ongoing novel treatment program carried out at an independent facility described below. Researchers carried out an independent secondary analysis of data collected as standard practice by this organization. Data was anonymized by a third party and sent to researchers for analysis. This study was approved by the University of Alberta Human Research Ethics Committee (Ethics review number: Pro:00089614).

4.3.2 Study Design

4.3.2.1 Assessment Tool

To assess cognitive performance, participants used an interactive cognitive assessment app—known as MyCognition Quotient (MyCQ)—which has been shown to have high correlation with other, more intensive, computer based cognitive testing programs[28]. This app examines cognitive functioning in five different domains: attention, episodic memory, executive function, processing speed, working memory, and also produces an overall cognitive score combining all five domains. The program is comprised of the most validated psychometric tests used in neuropsychological research and has been validated by comparison to the commonly used Cambridge Neuropsychological Automated Test Battery (CANTAB). It is considered a cost-efficient and easily administrable tool that is appropriate for a variety psychiatric populations[28].

Each individual assessment produces a score based on the MyCQ algorithm that incorporates accuracy and latency to derive the value. Scores represent percentile performance an individual as compared to their age group. These age standard scores are derived from a comprehensive database including data from more than 17,000 individuals who have been involved in standardized assessments previously. The scores follow a normal distribution curve and are therefore non-linear. For example, a MyCQ score of 50.00 would indicate average performance (or 50th percentile) for that individual for their age. Participants were evaluated in each domain at initial admission into the treatment program and at “graduation” (final discharge) at 12-months.

4.3.2.2 Participants

Each participant attended a residential treatment facility known as the Little Warriors Be Brave Ranch (BBR). Participants were referred to the program and then screened for acceptable inclusion. Inclusion criteria for the program included: children aged 8-12 with a known and disclosed history of at least one incident of CSA; psychologically-minded/able to benefit from therapy; IQ > 80 as determined by previous assessments; medically stable and compliant with medications; family/caregiver is identified and involved; completion of a readiness assessment.

Baseline scores were collected for each individual based on their first successful completion of the assessment. Of the 76 children enrolled in the study, 62 (81.6%) completed at least a baseline assessment, while 54 (71.5%) completed more both assessments and the treatment program.

Reasons for missing baseline assessment were a combination of technical errors and incomplete assessments, while removal or dropout from the program accounts for those who completed only a baseline assessment.

4.3.2.3 Program Design

The BBR is a complex, multimodal, and episodic treatment program specifically designed for youth CSA survivors. The program consists of four treatment rounds spanning over the course of 12-months. The initial treatment round is a 4-week stay at the ranch, followed by three 12-day stays at 3-months, 6-months, and 12-months after initial admission. The ranch is located in a semi-rural area in Alberta, Canada and includes a number of communal lodges designed to accommodate the children and give the ranch a "camp-like" feel. The ranch contains a number of advanced security features designed to provide safety for the children; this includes a security-guarded gate, a secured fence, and a confidential location. The facility has been specifically designed to exceed the required safety and regulatory guidelines and is assessed regularly by the proper authorities.

During their stay at the ranch, each child is administered a daily comprehensive schedule that primarily revolves around trauma-focused Cognitive Behavioral Therapy (tf-CBT). Daily and weekly meetings with therapists and staff ensured that there was consistency in treatment. The tf-CBT program involved the following components: (1) skill-building phase that aimed at improving behavioural, affective, biological, and cognitive self-regulation; (2) careful and gradual exposure to the child's trauma in a safe and controlled setting; (3) cognitive processing of the child's personal traumatic incident as achieved through the development of a trauma narrative; (4) combined child-caregiver sessions and safety planning to develop treatment closure. This approach has been shown to have lasting positive effects for CSA victims[29].

The children were also scheduled for a number of recreational activities that were designed to make the program more enjoyable and not solely therapeutic. These activities included: arts and crafts, structured play, animal therapy, cognitive-training, musical activities, yoga and meditation, and physical exercise. Each activity was properly supervised and carried out under strict guidelines. Roughly 6 hours each day were allocated to structured activities, with the remainder of the day being reserved for free time and meals. Each child also spent approximately 2 hours each week working on Eye Movement Desensitization and Reprocessing (EMDR), which is an empirically validated treatment for adverse childhood experiences and trauma[30]. As such, this program is considered a complex, episodic, and multimodal intervention focused around the tf-CBT.

4.3.2.4 Statistical Analysis

In order to compare the baseline assessment scores against the age standard performance, two-tailed independent *t*-tests were carried out for the overall score as well as each of the five cognitive domains. To compare the change in the mean scores for each domain over the course of treatment, paired sample, two-tailed t-tests were carried out. Statistical significance was considered at p <0.05.

4.4 Results

4.4.1 Baseline Cognitive Performance

Table 1 shows the mean baseline scores for each domain. At baseline, the mean overall MyCQ score was 48.6 ± 11.5, 1.4 percentiles below the age group standard (p=0.36). The highest mean MyCQ score was observed in working memory (61.3 ± 14.3, p <0.001), while the lowest mean MyCQ score was in processing speed (41.8 ± 14.1, p <0.001). At baseline, mean scores for attention (44.5 ± 14.9, p<0.008), executive function (44.3 ± 13.2, p<0.002), and overall cognition were below age-standard performance.

Insert **Table 1** here

4.4.2 Change in Cognitive Performance Over Treatment

MyCQ scores at baseline and graduation are summarized in Table 2 and Figure 1. In total, four of the five cognitive domains showed improvement in mean MyCQ scores at graduation as compared to baseline, including the overall MyCQ score. The greatest improvement occurred in executive function, increasing 6.1 percentiles and 13.8% from baseline ($p<0.001$). Statistically significant improvements also occurred in attention (13.5%, $p=0.009$), working memory (7.3%, $p=0.021$), and the overall combined score (9.1%, $p=0.005$). Episodic memory was the only domain in which the mean MyCQ score was reduced, decreasing 1.9 percentiles and 3.5% from baseline, but this result was not statistically significant ($p=0.47$).

Insert **Table 2** and **Figure 1**

Figure 2 shows the number of children who were at or above their age standard performance (≥50.0) at baseline and at final discharge for each domain. Episodic memory was the only domain that saw a reduction in the number of children at or above the age standard, with 6 fewer children scoring 50.0 or above. All other domains saw an increase in the number of children scoring at or above the average for their age. Executive function and attention had the largest improvements, with 11 and 10 more children scoring at or above average, respectively.

Insert **Figure 2** here

4.5 Discussion

4.5.1 Main Findings

The findings of this study provide preliminary evidence for our hypothesis that a multimodal treatment program designed for youth CSA survivors may enhance cognitive performance. This was supported by our findings, with statistically significant improvements being found in attention, executive function, and working memory, as well as in the overall assessment score. Secondarily, we predicted that children with a history of sexual abuse would have lower baseline cognitive performance assessments than the age standard population. Mean scores in attention, processing speed, and executive function were lower at baseline as compared to the age-group standard, which may suggest that this population is at a higher risk for cognitive impairment; however, the results are inconclusive as to whether overall cognition was below average in this sample.

Current research suggests that early-life trauma, particularly when it leads to posttraumatic stress disorder (PTSD), is a strong predictor of cognitive impairment[19,21,22,31]. This may be due to the impacts of early-life stress, which has been found to induce structural and functional changes to areas of the brain essential for complex cognitive processes and higher order emotional control[32,33]. Children with histories of maltreatment have also been shown to have altered epigenetic profiles in genes responsible for stress regulation, and this impact has been shown to be intergenerational[34]. Treatment aimed at improving stress regulation through trauma-focused CBT may have the capacity to improve access to higher-level functioning. A recent study conducted by Garrett et al. (2021)[35] found improved structural changes in brain regions associated with executive functioning in youth undergoing trauma-focused CBT for their PTSD. Considering this, it is reasonable to assert the complex multimodal treatment program is partly responsible for the observed improvements in cognitive performance.

Interestingly, both episodic and working memory scores were above average at both timepoints. Working memory scores were particularly high, ranking in the 61st percentile at baseline and the 66th percentile at graduation. Victims of trauma are often hypervigilant in the presence of a perceived threat[36]. By design, working memory is meant to be short-lived and acute, responding to immediate stimuli in the environment. The hypervigilance associated with PTSD and early-life trauma may explain the notably higher scores in this cognitive domain. However, a study conducted by Dodaj et al. (2017)[37] noted that survivors of childhood maltreatment were more likely to have reduced working memory capacity in adulthood as compared to non-abused individuals, which conflicts with our findings. Episodic memory was the only domain that showed a reduction in cognitive performance with treatment, but this reduction was relatively small and not statistically significant. For many survivors, memories of traumatic events tend to be repressed over time, which would indicate a reduction in episodic memory[38]. However, fMRI studies have noted elevated hippocampal activity in individuals with histories of trauma who often re-experience their trauma[39]. Re-experiencing traumatic events in a controlled manner, a hallmark of trauma-focused CBT, may induce a reduction of neural activity in these overstimulated brain regions, effectively dampening episodic memory performance[40]. Furthermore, individuals with PTSD are particularly susceptible to deficits in episodic memory[41], often experiencing spouts of vivid memory, usually activated by trauma-related stimuli[42]. Thus, this reduction of episodic memory could conceivably also represent a positive outcome of the treatment program.

Given that cognitive deficits are common in CSA victims, it is essential that a useable tool be established in order to properly measure changes in cognitive functioning. From our experience, despite the young age and traumatic histories of the study participants, the children did not appear to have difficulties completing assessments. MyCQ appears to be specifically useful in that performance can be differentiated into individual domains of cognitive performance. However, a useability analysis was not conducted as part of this study; future research should investigate the acceptability of MyCQ in youth residential mental health treatment programs.

4.5.2 Limitations & Future Research

There are a number of limitations to this study that should be noted. First, this study was a retrospective analysis of data collected by a not-for-profit treatment program in which there was no specific control group. However, a utility of the MyCQ app is that scores indicate percentile rank compared to age standard performance; this was considered a the best available substitute for a comparison group. Second, as demographic information was not collected by the program, participants were not controlled for gender, ethnicity, or useful environmental factors such as caregiver involvement and home environment. Without this information, more rigorous statistical analysis could not be carried out. Fourth, because the treatment program was a complex multimodal intervention, it is difficult to determine whether one particular intervention or therapy was responsible for the improvements seen in cognitive performance, or if improvements were a result of the hospitable and safe environment inherent to the treatment program. Additionally, it would have been useful to have measured cognition at each treatment round to get a better indication of cognitive changes over the course of treatment, or follow-up information to determine whether cognitive improvements held following the end of the treatment program.

Finally, considering a number of studies have suggested that a PTSD diagnosis is a better predictor of cognitive deficits than having a history of trauma[21], it may be useful to compare cognitive performance in CSA victims with and without a diagnosis of PTSD.

4.5.3 Conclusions

The findings of this study suggest that a multimodal treatment program specifically aimed at treating CSA survivors may improve cognitive performance in this population. Despite their traumatic histories, participants in this study were able to collectively score at or above their age group in most cognitive domains by the end of treatment. Considering victims of early-life trauma are more likely to experience cognitive impairment, it is essential for treatment programs aimed at treating this population to incorporate measures of cognitive performance into standard practice. In doing so, the impact of early-life trauma on cognition, and the ways in which these impacts can be prevented and treated, will become clearer.

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4.7 Additional Information

4.7.1 Declaration of Interest

There are no conflicts of interest to disclose. Neither Little Warriors staff or MyCognition staff were involved in the analysis of the data presented in this publication.

4.7.2 Funding

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4.7.3 Acknowledgements

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4.7.4 Author Contribution

Research questions, study design and research methods were developed by MR, HP, WP, and PS, with expertise and consultation provided by AG, VA, GH, YW, and LS. Manuscript was written primarily by MR, with assistance from HP and PS. Data were collected by WP and LS and provided to MR for statistical analysis. All authors contributed to the editorial process and approved the final version of this manuscript.

4.8 Tables

4.8.1 TABLE 1. Baseline MyCQ scores for five different domains of cognitive performance in children admitted into a multimodal treatment program specifically designed for child sexual abuse survivors. Scores represent percentile aged-related performance. Two-tailed independent t-tests assessed statistical significance in the difference from expected performance

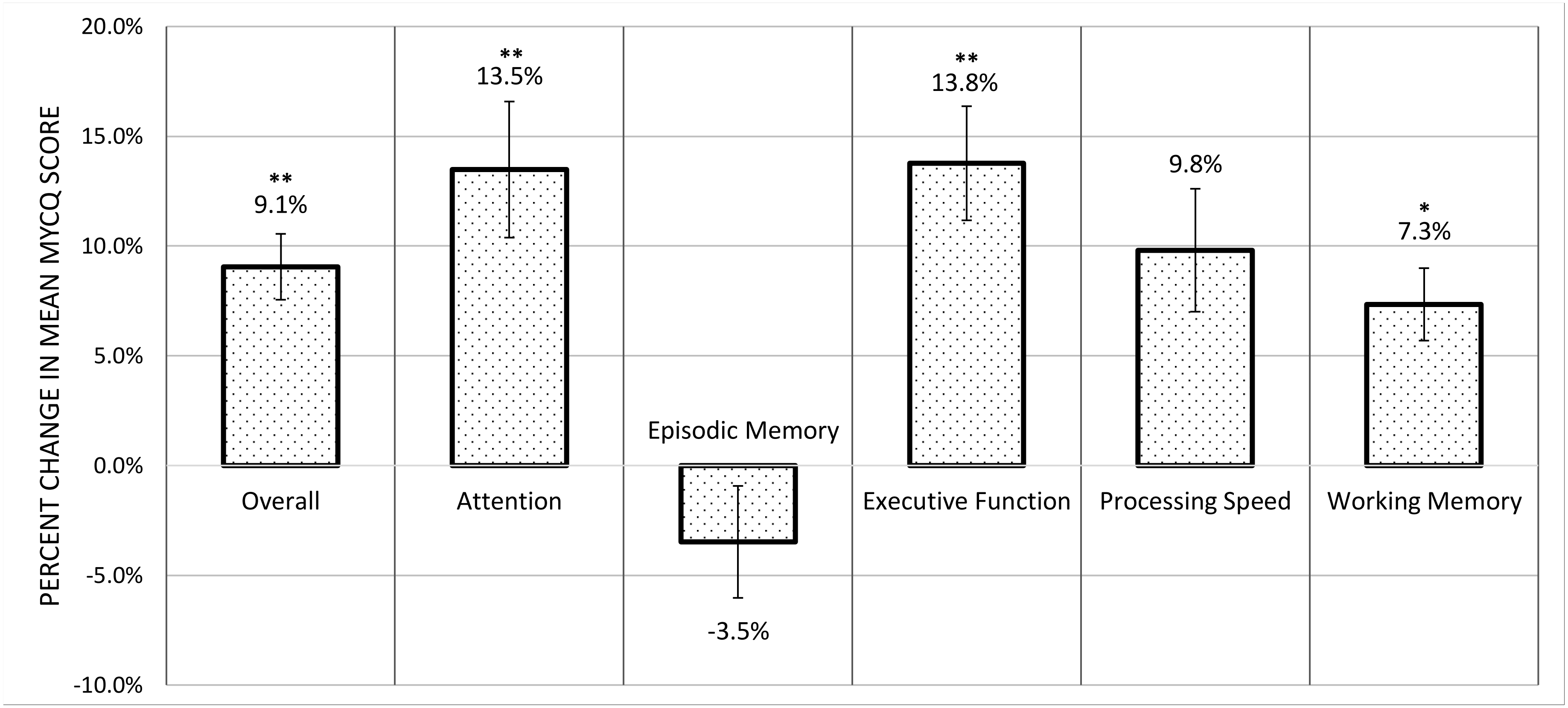
Cognitive Domain	µ Baseline (SD)	Percentile difference from age-average	p-value
Overall	48.6 (11.5)	-1.4	0.36
Attention	44.5 (14.9)	-5.5	0.008
Episodic Memory	54.6 (14.6)	4.6	0.02
Executive Function	44.3 (13.2)	-5.7	0.002
Processing Speed	41.8 (14.1)	-8.2	<0.001
Working Memory	61.3 (14.3)	11.3	<0.001

4.8.2 TABLE 2. Cognitive performance scores for five domains of cognition in child sexual abuse survivors (aged 8-12) undergoing a multimodal treatment program for their abuse (n=54). Scores were measured at initial admission (baseline) and final discharge (graduation) at 12-months. Scores are measured by the MyCQ cognitive performance app and represent a percentile of performance for a given age group as compared to a control database (i.e., scores of 50 indicate average performance for a given age group.

Cognitive Domain	µ Baseline (SD)	µ Graduation (SD)	Δ	Δ %	p-value
Overall	**48.6 (11.5)**	**53.0 (11.5)**	**4.4**	**9.1%**	**0.005**
Attention	44.5 (14.9)	50.5 (14.6)	6.0	13.5%	**0.009**
Episodic Memory	54.6 (14.6)	52.7 (18.1)	-1.9	-3.5%	0.47
Executive Function	44.3 (13.2)	50.4 (9.6)	6.1	13.8%	**<0.001**
Processing Speed	41.8 (14.1)	45.9 (18.0)	4.1	9.6%	0.13
Working Memory	61.3 (14.3)	65.8 (15.0)	4.5	7.3%	**0.021**

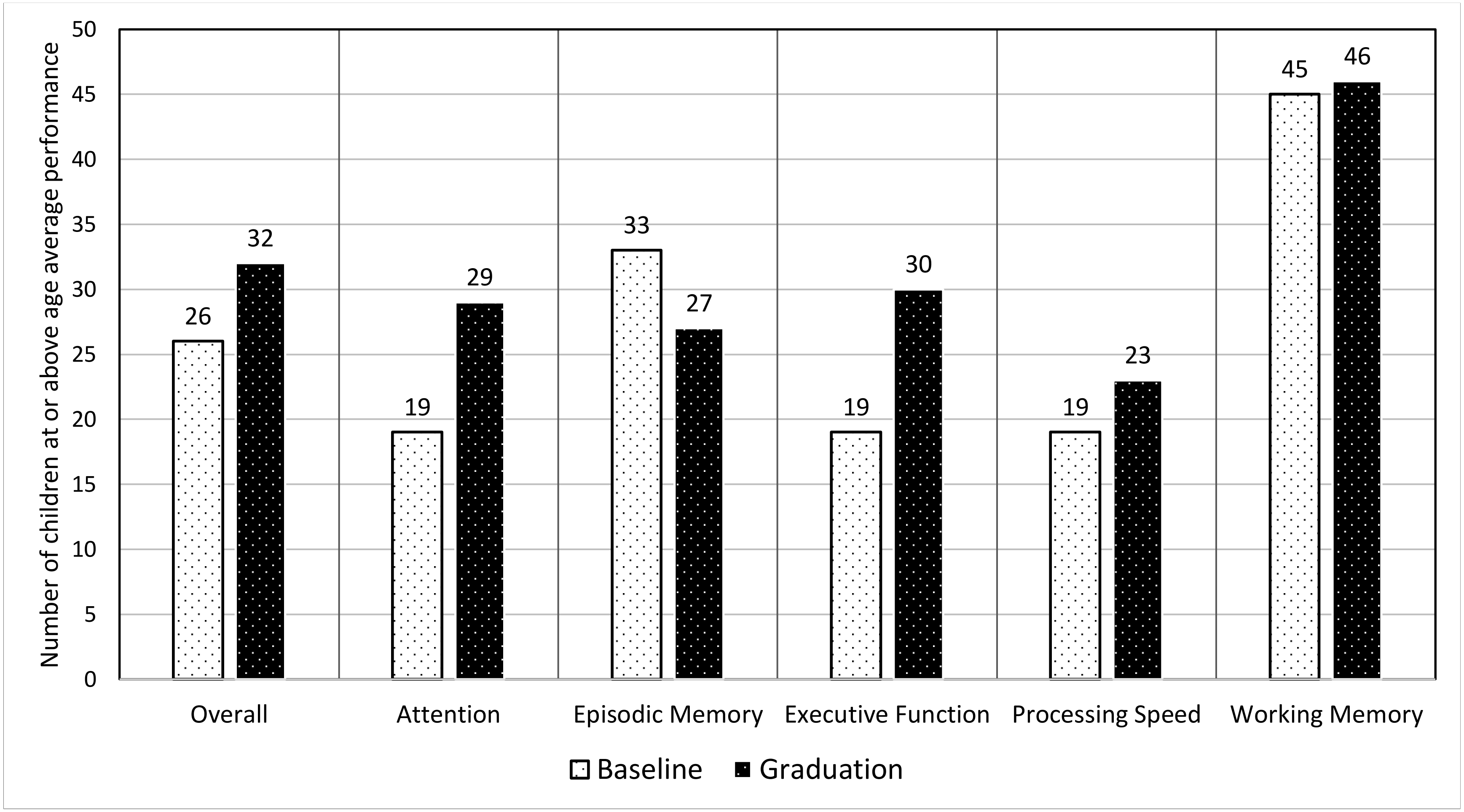
4.9 Figures

4.9.1 FIGURE 1: Percent change in mean cognitive performance scores (as measured by the MyCQ app) for five domains of cognition in child sexual abuse survivors (aged 8-12) undergoing a multimodal treatment program for their abuse (n=54). Scores were measured at initial admission (baseline) and final discharge (graduation) at 12-months.



Footnote*:* **p* <0.05; ** *p* <0.00; variability indicators represent standard error

4.9.2 FIGURE 2. Number of children at or above the average cognitive performance for their age in five domains of cognition as measured by the MyCQ app (n=54). Number of children at or above this level are noted at initial admission (baseline) and final discharge at 12-months (graduation).



Chapter 5A: A novel 2-week Intensive Multimodal Treatment Program for Child Sexual Abuse (CSA) Survivors is Associated with Mental Health Benefits for Females aged 13-16

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5a.1 Abstract

Study Objective: The aim of this study was to evaluate the psychiatric outcomes for the first cohorts of adolescent female Child Sexual Abuse (CSA) survivors after 2-weeks in an intensive multimodal treatment program designed for this population.

Method: Baseline data was collected at intake and again immediately prior to discharge. Data collected included demographic information, as well as measurement of standardized scales for PTSD, depression, anxiety, quality of life, self-esteem, and resilience. Mean scores at baseline and discharge were statistically analyzed to determine the effect of the treatment program on these measures.

Results: From the first twenty-seven (27) adolescent female CSA survivors, who completed 2-weeks of the multimodal treatment program, all three symptomatic scales showed statistically significant improvements from baseline. There were decreases in mean questionnaire scores for Depression (-23.8%, $p = 0.001$), Anxiety (-20.6%, $p = 0.006$), and PTSD (-20.3%, $p = 0.002$), as well as decrease of nearly 50% in the number of participants who were having active suicidal thoughts. In keeping with this, there were also statistically significant improvements in ratings for Quality of Life (17.6%, $p = 0.022$), Self-Esteem (22.9%, $p = 0.010$), and Resilience (6.9%, $p = 0.019$).

Conclusion: This study presents preliminary findings from an intensive 2-week multimodal treatment program specifically designed to help survivors of child sexual abuse (CSA). The highly positive short-term findings suggest that further longer-term follow-up in larger groups is appropriate. These preliminary results also support ongoing research for such intensive multimodal programs.

5a.2 Introduction

Child sexual abuse (CSA) is an all too common form of early-life trauma that affects youth across the globe. CSA encompasses a diverse set of sexually-related behaviours, including intercourse, attempted intercourse, oral-genital contact, and exposure to adult sexual activity or pornography[1]. It is estimated that 1 in 6 females and 1 in 12 males experience at least one significant incident of sexual abuse prior to adulthood[2,3]. Young females are particularly susceptible to CSA, with approximately 20% of females in Canada and the United States experiencing some form of sexual abuse before the age of 18—making them more at least twice as likely to experience CSA than males[4,5]. Individual experiences can vary considerably, and this can manifest into a variety of negative longer-term psychiatric outcomes. Evidence indicates that there are common and persistent mental health consequences related to exposure to CSA, including elevated risk for post-traumatic stress disorder (PTSD), depression, anxiety, substance abuse, suicidal ideation, eating disorders, sexual dysfunction, and cognitive deficits[6-9]. The most common outcome for CSA victims is PTSD, with an estimated 36% of children who are exposed to CSA later meeting the criteria for a PTSD diagnosis[10]. With growing awareness of the prevalence of CSA, increasingly more adolescents have disclosed their abuse, particularly closer to the time of the incident(s) rather than delaying disclosure[11]. For these reasons, as well as a possible increase in the incidence of CSA, it has become essential for mental health professionals to develop novel interventions aimed at directly treating the effects of CSA.

At present, there is limited research clarifying the best-practice treatment for CSA survivors—this is particularly true for youth[12]. Current literature on treatment options for children subject to maltreatment have shown Cognitive Behavioural Therapy (CBT), in particular Trauma-Focused Cognitive Behavioural Therapy (tf-CBT), to be the most effective in treating victims of CSA[13,14]. This appears to be particularly true for CBT interventions that involve non-offending caregivers[15,16]. That being said, comparative literature between treatment options is lacking and requires further research[13].

One of the primary challenges in developing an effective treatment program is the diversity of circumstances incorporated with the traumatic incident(s). It is important to note that CSA is not a disorder, it is a specific form of trauma that can manifest into a varied set of negative outcomes[14]. The age and sex of the child or adolescent, the frequency or number of incidents, as well as the child's relationship to the perpetrator, are all relevant factors that can influence treatment outcomes[1]. Other treatments, including art therapy[17], animal assisted therapy[18,19], play therapy[20], eye movement desensitization and reprocessing (EMDR)[21,22], and group therapy[23,24], are also considered viable treatment options. There is some preliminary evidence that incorporating a number of different therapeutic options, centered around tf-CBT, into one comprehensive regimen—an intensive multimodal treatment program—could be beneficial for child CSA victims, especially those with CSA-induced PTSD[25]. However, there is limited research investigating the effects of an intensive multimodal program for CSA survivors—this is particularly true for adolescent female CSA victims. The implementation of such a program has the capability to induce long-term positive effects across a number of affected mental health domains.

5a.2.1 Study Objective

The current research aims to assess a novel, intensive multimodal treatment program for adolescent female CSA survivors carried out at a dedicated facility, the Be Brave Ranch. By comparing self-report outcome measures over the course of 2-weeks of treatment, we assessed the effect initial treatment had on a variety of mental health domains. In doing so, we hoped to examine evidence for the potential impact of the treatment regimen, which may additionally help with future implementation of similar programs.

5a.3 Materials and Methods

5a.3.1 Study Design

This study was conducted as a part of a novel ongoing treatment program at the Be Brave Ranch, an independent facility described below, which is dedicated to treating child and adolescent CSA victims. Participants were recruited from October 2018-November 2019. As a standard part of the program, each participant completes a number of psychiatric self-report questionnaires aimed at assessing different psychiatric outcomes. All surveys were administered by staff at the Be Brave Ranch. Surveys were administered at initial admission (baseline) and again immediately prior discharge after 2-weeks in the treatment program. Anonymized data was sent to a third-party server where it was encoded and sent to the researchers for a secondary independent analysis of the collected data. Changes in scores over the course of treatment were determined in order to assess the potential impact of the program.

We performed an independent analysis of the anonymized data. This second-level independent analysis of previously collected data was approved by the University of Alberta Human Research Ethics Committee (Ethics review number: Pro00089614).

5a.3.2 Treatment Program

Each participant attended a residential facility known as the “Be Brave Ranch” (BBR). The Be Brave Ranch is funded through a not-for-profit charitable organization that relies solely on donations. The current adolescent girls program has the capacity to treat up to six individuals per cohort. Each cohort receives 8-weeks of treatment divided into four 2-week visits that occur at baseline, 3-months, 6-months, and 1-year. At present, the Be Brave Ranch’s Adolescent Girls Program treats 5-7 cohorts/year, translating into roughly 30-40 individuals per annum. The present report is for the first 2-weeks only, and reports data for all initial cohorts.

Inclusion criteria for the program included:

- individual is biologically female,
- 13-16 years of age (with potential exceptions for mature minors),
- psychologically-minded/able to benefit from therapy,
- IQ >80 as determined by previous assessments,
- medically stable and compliant with medications,
- family/caregiver is identified and involved,

    - Caregivers are not directly involved in the treatment process, but caregiver involvement outside of the program is imperative. Furthermore, the adolescent must have disclosed their abuse to at least one caregiver.
- completion of a readiness assessment.

A total of 31 participants were admitted into the program for treatment. Of the 31 participants admitted into the program, four were omitted from the study—three individuals dropped out shortly after admission and therefore had no second data point. There were no significant differences between the baseline data from the drop-out participants and that of those who were included in the study. One participant incompletely answered a number of questions at both timepoints and was excluded for having incomplete information.

5a.3.2.1 Program Design

The intensive multimodal treatment program includes the following therapies:

1. Trauma-Focused Cognitive Behavioural Therapy (tf-CBT)
2. Group Therapy
3. Individual Therapy
4. Eye Movement Desensitization and Reprocessing (EMDR)
5. Yoga and Meditative Therapy
6. Art Therapy
7. Music Therapy
8. Cultural Activities
9. Recreational Therapy
10. Animal-Assisted Therapy

Although there is a general schedule for each therapy, the allocation of time differs based on which visit the participants are attending, as well as for each individual participant based on their particular needs.

The program's therapeutic framework is modelled after the Neurosequential Model of Therapeutics (NMT)[26]. NMT is a therapeutic 'bottom-up' approach that aims at a treating lower brain networks (such as brainstem and limbic circuits) in order to develop structure and stability in these regions. From a neurodevelopmental perspective, it is necessary that these regions properly develop in order to successfully access and treat higher cortical networks. As a result, the first 2-weeks of treatment are heavily focused on therapies that target development of lower level networks. Although tf-CBT is the primary component of the multimodal program, there is less time spent on tf-CBT in the first 2-week treatment period as opposed to the subsequent three 2-week treatment periods. Further to this, the distribution of each therapy is individualized based on each participant's needs; that is, although there is a general framework for each treatment options, therapists have the capacity to individualize intervention schedules based on the participants' needs and level of development.

The full program involves four 2-week intensive therapy periods over a 1 year period. However, in the current publication we examine the initial data available for the first 27 participants from their initial 2-week component only. We intend to analyze longer-term outcomes subsequently.

The BBR is located in a semi-rural area in Alberta, Canada and includes a number of communal lodges designed to accommodate the teens and give the ranch a "camp-like" feel. The BBR contains a number of advanced security features designed to provide safety for the adolescents; this includes a 24-hour security-guarded gate, a secured fence, and a confidential location. The BBR facility has been specifically designed to exceed all required safety and regulatory guidelines, is appropriately licensed, and is assessed regularly by all appropriate authorities.

During their stay at the BBR each teen was administered a daily comprehensive schedule that always included Trauma-Focused Cognitive Behavioural Therapy (tf-CBT). Daily and weekly meeting with therapists and staff ensured that there was consistency in treatment. The tf-CBT program involved the following four components: (1) skill-building phase that aimed at improving behavioural, affective, biological, and cognitive self-regulation; (2) careful and gradual exposure to the child's trauma in a safe and controlled setting; (3) cognitive processing of the child's personal traumatic incident as achieved through the development of a trauma narrative; (4)

combined child-caregiver sessions and safety planning to develop treatment closure[25]. This approach has previously been shown to have lasting positive effects for CSA victims[27].

The teens were also scheduled for a number of recreational activities that were designed to make the program more enjoyable, and to help build camaraderie and trust. These activities included: arts and crafts, structured play, animal therapy, cognitive-training, musical activities, and physical exercise. Each activity was properly supervised and carried out under a detailed plan linking them to therapy goals. Roughly 6 hours each day were allocated to structured activities, with the remainder of the day being reserved for free time and meals. As such, this program is considered an intensive multimodal intervention focused around tf-CBT.

5a.3.3 Data Collection

As part of the treatment program, each participant was asked to fill out a survey at intake (baseline) and upon discharge at the end of the initial 2-week visit. Surveys ask basic demographic and environmental questions, followed by a several clinically validated self-report youth psychiatric outcome measures to measure (1) Adverse Childhood Experiences (ACEs), (2) Post-Traumatic Stress Disorder (PTSD), (3) Substance Abuse (4) Depression, (5) Anxiety, (6) Quality of Life, (7) Self-Esteem, and (8) Resilience. Anonymized data was then provided to the research team for evaluation. Questionnaire scores at baseline and discharge were compared to assess whether or not symptom improvement occurred in a variety of psychiatric domains.

5a.3.3.1 Assessment Details

5a.3.3.1.1 Demographics

Participants were asked their age, grade, gender, Indigenous status, and living situation in the first part of the assessment.

5a.3.3.1.2 Nature of the Trauma

Details about the traumatic event, including number of incidents (one or multiple), age at first incident, whether or not the victim knew the offender, and whether the offender was an adult or child/adolescent, was asked of the caregiver(s) of the teen. The teens themselves were also asked the same information only if, after revealing their trauma, they felt believed, supported, and that if their disclosure was acted on properly.

5a.3.3.2.Outcome Measures

5a.3.3.2.1 Adverse Childhood Experiences

History of Adverse Childhood Experiences (ACEs) was measured using the Center for Youth Wellness ACE-Questionnaire (CYW ACE-Q)[28]. The CYW ACE-Q is not considered a validated diagnostic tool; however, it has been shown to be an effective tool for measuring exposure to adversity in adolescents[29]. The CYW ACE-Q is an 18-question survey that asks binary "yes/no" questions pertaining to a variety of common adverse events experienced by youth, including the standard 10 ACE items. Scores with an answer of "yes" are given 1 point and the total is summed. As such, higher scores indicate more ACEs experienced by the individual. A CYW ACE-Q score of >3 combined with symptomatology is generally considered an indicator for treatment referral[29]. The CYW ACE-Q was collected only at baseline.

5a.3.3.2.2 PTSD

Post-Traumatic Stress Disorder symptoms were assessed using the Child PTSD Symptom Scale (CPSS), a validated self-report measure for this population[30,31]. The CPSS contains 17-questions relating to the frequency of each PTSD symptom listed in the *DSM-IV.* Each question contains a Likert-scale ranging from 0 (*not at all*) to 3 (*5 or more times a week*). Potential total scores range from 0-51 and represent the following sub-categories: (0-10) *Below Threshold*, (11-15)

Subclinical/Mild, (16-20) *Mild*, (21-25) *Moderate*, (26-30) *Moderately Severe*, (31-40) *Severe*, and (41-51) *Extremely Severe*, and a score of 15 or higher is considered an appropriate clinical cut-off for diagnosing PTSD. CPSS scores were collected at both baseline and discharge.

5a.3.3.2.3 Substance Abuse

Substance Abuse was measured using the CRAFFT screening tool, named after the 6-questions it asks relating to the individual's history of substance use (Car, Relax, Alone, Forget, Friends, Trouble). The CRAFFT is a validated self-report measure for adolescents[32]. The CRAFFT consists of three introductory questions relating to alcohol, marijuana, and drug use. If that participant answers "yes" to any of the first three questions, they are asked to continue on to the 6 CRAFFT questions, and a score is recorded based on how many of these are answered as "yes." If the participant answers "no" to all three introductory questions, a score of 0 is recorded. Scores range from 0-6, with a score of 2+ indicating a high risk for substance abuse. For our purposes, two extra questions were added pertaining to the use of smoked and smokeless tobacco products. The CRAFFT was collected only at baseline for this portion of the treatment program.

5a.3.3.2.4 Anxiety

Anxiety symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS), a validated self-report measure for this population[33]. The HADS is a 14-question scale relating to both anxiety and depression symptoms. For our study, only the anxiety subscale was included, as a separate questionnaire (described below) was used to measure depression symptoms. Questions were answered on a Likert-scale ranging from 0-3 with the answers changing depending on the question. Scores ranged from 0-21, with higher scores indicating a greater degree of anxiety. Scores of 0-7 are considered *Normal*, 8-10 *Borderline Abnormal*, and >10 *Abnormal*; as such, scores >7 indicate a clinical cut-off for an anxiety disorder diagnosis. HADS scores were collected at both baseline and discharge.

5a.3.3.2.5 Depression

Depression symptoms were assessed using the Patient Health Questionnaire—adolescent version (PHQ-A), a validated self-report measure for this population[34,35]. The PHQ-A is a 9-question scale that is used to assess the severity and frequency of depressive symptoms for children aged 11-17. Each question is scored on a Likert-scale that ranges from 0 (*not at all*) to 3 (*nearly every day*). Scores range from 0-27, with higher scores indicating a greater degree of depression. Scores are broken down into the following sub-categories: (0-4) *No Symptoms* (5-9) *Mild,* (10-14) *Moderate,* (15-19) *Moderately Severe*, (20-27) *Severe.* A score of 8-11 is considered an appropriate cut-off for a major depressive disorder diagnosis[36]. PHQ-A scores were collected at both baseline and discharge.

Question 9 on the PHQ-A asks the participant how often, over the last 2-weeks, they have had "thoughts that you would be better off dead or hurting yourself in some way." If the participant answers anything greater than a score of 0 (*not at all*), then they are asked to answer two extra questions pertaining to suicidal ideation and attempt. The number of participants who answered these extra questions was recorded.

5a.3.3.2.6 Quality of Life

Quality of life was measured using the KIDSCREEN-10, a validated self-report measure for this population[37]. KIDSCREEN-10 consists of 10 questions inquiring about how often the individual has had positive experiences related to a high quality of life. Each question is scored on a Likert scale that ranges from 0 (*not at all/never*) to 4 (*extremely/always*). KIDSCREEN-10 also contains a bonus question which asks: "In general, how would you say your health is?" in which the answers range from 0 (*poor*) to 4 (*excellent*). Scores range from 0-44, with higher scores indicating a better quality of life. KIDSCREEN-10 scores were collected at both baseline and discharge.

5a.3.3.2.7 Self-Esteem

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES), a validated self-report measure for this population[38]. The RSES consists of 10 questions that ask the individual how much they agree or disagree with a statement relating to how they view themselves. Each question is scored on a Likert-scale (0-3) that range from *Strongly Agree* to *Strongly Disagree*, depending on the question. Scoring is achieved through summation of results, and can range from 0-30, with higher scores indicating better self-esteem. A score between 15-25 is considered in the normal range, with scores below 15 suggesting low self-esteem. RSES scores were collected at both baseline and discharge.

5a.3.3.2.8 Resilience

Resilience was measured using the Child & Youth Resilience Measure – adolescent version (CYRM-12), a validated self-report measure for this population[39.40]. The CYRM-12 consists of 12 questions that ask the participant to answer the extent to which they believe the statements describe them. Answers range from 1 (*Not at all*) to 4 (*Quite a bit*), and scores range from 12-48, with higher scores indicating more characteristics associated with resilience. CYRM-12 scores were collected at both baseline and discharge.

5a.3.4 Statistical Analysis

In order to compare mean scores at baseline and discharge, as well as to compare changes in the scores of individual questions, 2-tailed paired *t*-test were carried out. For all statistical tests, a 95% confidence interval was used; that is, $p < 0.05$ was considered a statistically significant change in survey and question scores. However, to account for type I errors, the Benjamini-Hochberg method was used to correct for false discovery. Only results whose adjusted p-values that remained in the 95% confidence interval after this correction (i.e., $p < 0.05$) were considered statistically significant. Results show mean ± standard deviation.

5a.4 Results

5a.4.1 Demographics

Thirty-one (31) females aged 13-16 were admitted into the treatment program (Table 1). The average age at admission was 14.3 ± 0.97. Ten of the female participants (32.3%) identified as Indigenous Canadian. The majority lived with at least one parent (57.1%), while 6 (28.6%) lived with a non-relative. The vast majority of participants indicated that they felt safe in their home (90.3%), that had their own bedroom (87.1%), spent time with friends outside of school (83.9%), and had an adult they can trust (83.9%). Demographic data for the 27 participants who completed both baseline and discharge surveys is summarized in Table 1.

Insert **Table 1** here

5a.4.2 Nature of the Trauma

Table 2 summarizes information regarding the nature of the sexual abuse in this population. The mean age at first offence was 5.9 ± 3.5 years. Twenty-four (88.8%) participants reported multiple incidents of sexual abuse, and 92.6% (25) knew their offender prior to the abuse. Among the 27 participants, 85.2% indicated that their offender was an adult, while 9 (33.3%) reported abuse by another child or adolescent. Twenty-three (85.2%) participants felt supported after they revealed their trauma, while only 18 (66.7%) felt believed and 17 (63.0%) felt that it was acted on properly.

Insert **Table 2** here

5a.4.3 Outcome Measures

5a.4.3.1 Adverse Childhood Experiences

The mean CYW ACE-Q score upon admission was 8.9 ± 3.3, with a range of 3-14 (Table 3). Since a history of CSA is a requisite for admission into the treatment program, 100% of the adolescents answered "yes" to question 6 which pertains to sexual abuse. Outside of CSA, the most frequently reported ACEs were victims of bullying (74.1%), divorced parents (74.1%), household member with mental illness (74.1%), verbal abuse (70.4%), feeling of being unsupported/unloved (66.7%), physical abuse (63.0%), heard or witnessed neighbourhood violence (63.0%), and household substance abuse (63.0%).

5a.4.3.1 Overall Results

Overall, all six questionnaires showed statistically significant "positive" improvements as it relates to the specific domain (**Table 3a/3b** & **Figure 1**). The PHQ-A showed the largest change in mean scores ($\Delta\% = -23.8\%$, $p = 0.001$), while the RSES, HADS, and CPSS all had statistically significant improvements of more than 20%.

Insert **Figure 1** and **Table 3a/3b** here

5a.4.3.2 Substance Abuse

The mean CRAFFT score at baseline was 1.76 ± 2.15, with 9 (33.3%) participants recording a score of 2 or more. Ten (37.0%) adolescents had previously smoked tobacco, while 22.2% (6) had used smokeless tobacco products.

5a.4.3.3 PTSD

The mean CPSS score at baseline was in the upper *Moderate* sub-category (29.7 ± 10.6; 95% CI [25.7, 33.7]) while the mean score at discharge was in the *Mild* sub-category (23.6 ± 12.3; 95% CI [18.7, 28.6]). The number of teens who scored at or above the clinical threshold for a PTSD diagnosis decreased from 25 (92.6%) at baseline to 20 (74.0%) at discharge (Figure 2). Five of the 17 questions (29.4%) showed a statistically significant reduction in PTSD symptoms after 2-weeks. Question 9 and 10 showed the greatest change in score/frequency (Δ% = -36.0%, $p = 0.007$; Δ% = -39.6%, $p = 0.008$, respectively). Question 9 asks how often the participant is “Having much less interest doing things you used to do.” Question 10 asks how often the participant is “Not feeling close to the people around you.”

5a.4.3.4 Anxiety

The mean HADS score at baseline was in the *Abnormal* sub-category (12.0 ± 4.3; 95% CI [10.3, 13.8]). The mean score at discharge was in the *Borderline Abnormal* sub-category (9.6 ± 4.8; 95% CI [7.6, 11.5]). The number of teens who scored at or above the clinical threshold for an anxiety disorder diagnosis decreased from 22 (81.5%) at baseline to 18 (66.6%) at discharge (Figure 2). Three of the 7 questions (42.9%) showed a statistically significant reduction in anxiety symptoms after 2-weeks. Questions 6 and 7 had the largest change in score (Δ%= -26.0%; $p = 0.025$; Δ% = -26.1%, $p = 0.021$, respectively). Question 6 states “I get sort of frightened feelings as if something awful is about to happen.” Question 7 states “I can sit at ease and feel relaxed.”

5a.4.3.5 Depression

The mean PHQ-A score at baseline was in the *Moderate* sub-category (15.6 ± 6.6; [13.0, 18.2]) with a range of 1-26; the mean score at discharge was in the *Mild* sub-category (11.9 ± 6.4; [9.3, 14.4]). The number of teens who scored at or above the clinical threshold for a major depressive disorder diagnosis decreased from 21 (87.5%) at baseline to 16 (59.3%) at discharge (Figure 2). Three of the 9 questions (33.3%) showed statistically significant reductions in depression symptoms after 2 weeks. Questions 1 and 4 had the greatest reductions (Δ%= -44.2%; $p = 0.0006$; Δ% = -31.3%, $p = 0.033$, respectively). Question 1 asks the participant how often they’re “feeling down, depressed, or irritable”; Question 4 asks how often the participant has experienced “poor appetite, weight loss, or overeating.”

Question 9, which asks the participant whether, in the last 2-weeks, they have had “thoughts that you would be better off dead or hurting yourself in some way?” showed a 47.5% decrease in scores (*p* = 0.001). Since the number of individuals who answered “not at all” to thoughts of suicide on Question 9 increased from 9 (33.3%) to 12 (44.4%), this suggested there was also a meaningful reduction in suicidal thinking (*p* = 0.04). Similarly, at baseline, 11 (61%) of those who had scored at least 1 on Question 9 had contemplated suicide in the previous month and 77.8% (14) admitted to having attempted suicide at least once in their lifetime. However, by 2-weeks only 40% reported having suicidal ideation (*p* = 0.01).

Insert **Figure 2** here

5a.4.3.6 Quality of Life

The mean KIDSCREEN-10 score at baseline was 19.3 ± 6.7 (95% CI [16.6, 22.0]). The mean score at discharge was 22.7 ± 7.3 (95% CI [19.8, 25.6]). Five of the 11 (45.5%) of the questions showed statistically significant improvements over 2-weeks of treatment. Question 4 showed the largest change (Δ% = 62.5%, *p* = 0.022), which asks the individual “Have you felt lonely?”

5a.4.3.7 Self-Esteem

The mean RSES score at baseline was 10.4 ± 6.0 (95% CI [8.0, 12.7]); the mean score at discharge was 12.7 ± 6.3 (95% CI [10.3, 15.2]). Both means fall within the *Low Self-Esteem* sub-category, but the number of participants who were above the *Normal Self-Esteem* threshold (>15) increased from 6 to 10. Three of the 10 questions (30.0%) showed statistically significant improvements after 2-weeks of treatment (Table 5). Question 1, which states “On the whole I am satisfied with myself” showed the greatest improvement in score (Δ% = 52.2%, *p* = 0.013)

5a.4.3.8 Resilience

The mean CYRM-12 score at baseline was 29.0 ± 7.5 (95% CI [26.0, 32.0]; the mean score at discharge was 31.2 +/- 6.5 (95% CI [28.6, 33.7]). Only Question 2 showed a statistically significant improvement ($\Delta\%= 32.6\%$, $p= 0.011$). Question 2 states "I know where to go in the community to get help."

5a.5 Discussion

Child sexual abuse (CSA) is a form of early-life trauma that can lead to psychiatric impairment across a number of domains[6,7,41,42]. Young females are particularly susceptible to CSA, with at least 20% of Canadian females experiencing one significant incident of sexual abuse before adulthood[4,5]. As such, the need for an intensive and multifaceted treatment program, specifically tailored for this population, is essential.

The preliminary findings from this study suggest that 2-weeks of an intensive multimodal treatment program specifically designed for adolescent female CSA survivors can induce positive changes across a variety of mental health domains. The results show that after 2-weeks of the treatment program, there was a noticeable reduction in negative symptoms (PTSD, depression, anxiety, and suicidal ideation) and an increase in positive domains (quality of life, self-esteem, resiliency). Further to this, all six outcomes showed statistically significant improvement from initial admission to discharge. While it is premature to draw any conclusions based on this preliminary data, these initial findings support the potential benefit of the regimen in treating this population.

As noted in the methods, the program was designed around the Neurosequential Model of Therapeutics (NMT)[26], which identifies the need for lower brain functional and developmental stability in order to make the participant more amenable to higher-level therapy, such as tf-CBT—the primary treatment component of the entire program. The NMT approach assists therapists in determining the vulnerabilities and strengths of the participant which can help to tailor the regimen to each individual's needs[43]. It's possible that the combination of this 'bottom-up' approach to treatment with the variability afforded to each individual was primarily responsible for the positive results. However, it is also likely that the stability and structure of the program—coupled with a potential respite from toxic home environment—was the primary cause of the observed changes.

One of the most pertinent reasons why these initial results are so important, however, is our finding that over 40% of our sample had expressed suicidal ideation in the previous month, and nearly 3/4 had actually attempted suicide in their lifetime. Significantly, there was nearly a 50% drop in such suicidal thoughts after the 2-week program. These results support previous findings suggesting that these adolescents are at particularly high risk for self-harm[44,45]; as such, improvements in the short term may have important prospective safety ramifications.

Secondary to the improvements we witnessed, we postulated that, upon admission, our population would have elevated scores for each outcome measure, as CSA survivors are at a higher risk for mental illness. The mean number of Adverse Childhood Experiences (ACEs) reported by this population was nearly triple the recommended indicator for treatment referral[29]. A majority of the participants had not only experienced CSA but had also been bullied, verbally and physically abused, experienced parental divorce, and lived with a mentally ill family member. At baseline, mean scores for PTSD were in the *Moderately Severe*, scores for anxiety were in the *Abnormal* range, and scores for depression were in *Moderate* range. Significantly, over 80% of our population met the clinical cut-off for comorbid PTSD, anxiety, and depression at intake. Mean self-esteem baseline scores were also considered to be *Low*. This highlights the propensity for CSA survivors to experience a wide-range of negative mental health symptoms that can only be combated by a comprehensive treatment program centered around treating the trauma itself.

5a.5.1 Limitations

There were limitations to this research which may reduce the generalizability of the current preliminary findings. Firstly, and importantly, this was not a controlled study. The program is designed and run by an independent not-for-profit organization and was not designed as a clinical research study. The lack of a control group precludes definitive determination of the potential effectiveness of the intervention. To address this, future research may include an appropriate control group. Comparing outcomes to waitlist controls or CSA survivors not currently undergoing treatment may improve the validity of these findings. The samples size (n=27) and brief follow-up period (2-weeks) may also limit the generalizability of the current findings. It is certainly possible that in larger samples different results may have been found, or that over longer-periods any initial changes may revert to the mean. To address this, both larger sample groups and longer-term follow up (for up to 12-months) are planned. In addition, there was no formal independent assessment. With data being collected entirely from self-report questionnaires, it is conceivable that such data may not reflect what would be found in independent interviews conducted by appropriately trained individuals. This may potentially be addressed by conducting detailed interviews with smaller sub-groups to determine how accurate the self-reported data may be. Multiple and different types of interventions were in place in the present program, leading to a further limitation in that any particularly beneficial program elements cannot be pinpointed. It is important to note that individuals were also in a novel and highly supportive location with peers who had experienced similar abuse and it is conceivable that non-specific benefits from these aspects of the program may have contributed to the clinical improvements seen. It is, therefore, not possible—without appropriate controls—to determine what specific aspects of the entire intensive multimodal intervention may have been most determinant of our results. To address this issue, future research is planned that will attempt to identify key components of the overall program. Lastly, it is important to be aware that it is likely that different individuals may have responded to different components of this multimodal program, and future research will be needed to parse out which aspects are most important for the largest number of individuals in an individual patient centered approach.

5a.5.2 Conclusion and Future Research

In conclusion, the current preliminary results indicate that an initial 2-week intensive multimodal treatment program designed for adolescent female CSA survivors may lead to improvement in several different mental health domains, including PTSD, anxiety, depression, and suicidality.

However, given the limitations from these preliminary findings, longer-term controlled studies are recommended before drawing firm conclusions on the longer-term effectiveness and generalizability of any improvements. The intensive nature of the program (four 2-week visits over the course of 1-year) inherently requires thorough assessment of the program's effectiveness in treating this population. Future research should compare the effects of such intensive programs with other, less intensive options such as outpatient tf-CBT or online DBT. Further analysis of the full 1-year program may help with some of these issues, particularly in terms of sustainability of these initial improvements suggested by the results to date. Ideally, increased scale and spread of an intensive multi-modal treatment approach, such as the one carried out at the Be Brave Ranch, with detailed assessments in place may also help us to identify key elements for a best-practice treatment program for CSA survivors.

5a.6 References

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5a.7 Additional Information

5a.7.1 Declaration of Interest

The author(s) declare no potential conflicts of interest with respect to research, authorship, or publication of this article.

5a.7.2 Funding

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5a.7.4 Author Contribution

All authors made significant intellectual contributions to this manuscript. Research questions, study design and research methods were developed by MR, HP, WP, and PS, with expertise and consultation provided by AG, VA, GH, YW, and LS. Manuscript was written primarily by MR, with assistance from HP and PS. Data was collected and statistically analyzed by MR with the assistance of input from PS, HP, and AG. All authors contributed to the editorial process and approved the final version of this manuscript.

5a.8 Tables

5a.8.1 TABLE 1. Demographic and environmental information for adolescent female child sexual abuse (CSA) survivors undergoing an episodic complex multimodal treatment program

Demographics		**n = 27**
Mean Age (years)		14.2 +/- 0.9
Identify as Indigenous		10 (37.0%)
Lives With:		
	Both Parents	6 (22.2%)
	One Parent	8 (29.6%)
	Relative	5 (18.6%)
	Other	8 (29.6%)
Environment		**n = 27**
Question:		Answered “Yes”
I spend time with friends outside of school		22 (81.5%)
I engage in activities outside of school (e.g., sports teams, clubs, organizations)		12 (44.4%)
I am involved in a community program (e.g., Big Brothers/Big Sisters)		3 (11.1%)
I have my own bedroom		25 (92.6%)
I feel safe at home		26 (96.3%)
I have an adult I can trust		23 (85.2%)

5a.8.2 TABLE 2: Information relating to nature of the child sexual abuse event(s) experienced by adolescent females undergoing an episodic complex multimodal treatment program for their traumatic experience(s)

Nature of the Trauma		n = 27
Mean age at first incident (years)		5.9 +/- 3.5
Number of incidents		
	One	3 (11.2%)
	Multiple	24 (88.8%)
Knew offender		25 (92.6%)
Offender:		
	Adult	23 (85.2%)
	Adolescent/Child	9 (33.3%)
When you first told somebody about your traumatic incident(s), did you feel:		Answered “yes”
	Believed	18 (66.7%)
	Supported	23 (85.2%)
	Like it was acted on properly	17 (63.0%)

5a.8.3 TABLE 3a. Parametric analysis results: Mean change in self-report outcome measures after 2-weeks of an episodic complex multimodal treatment program for adolescent female survivors of child sexual abuse (CSA) (n=27)

Questionnaire	Domain	Range	μ Baseline	95% CI	μ Discharge	95% CI	Δ	Δ%	*p*	*p**
CPSS	PTSD	0-51	29.7	[24.7, 33.7]	23.6	[18.7, 28.5]	-6.1	-20.3%	0.002	**0.009**
HADS	Anxiety	0-21	12.0	[10.3, 13.8]	9.6	[7.6, 11.5]	-2.4	-20.6%	0.006	**0.014**
PHQ-A	Depression	0-27	15.6	[13.0, 18.2]	11.9	[9.3, 14.4]	-3.7	-23.8%	0.001	**0.006**
KIDSCREEN-10	Quality of Life	0-44	19.3	[16.6, 22.0]	22.7	[19.8, 25.6]	3.4	17.6%	0.022	**0.031**
RSES	Self-Esteem	0-30	10.4	[8.0, 12.7]	12.7	[10.3, 15.2]	2.3	22.9%	0.010	**0.019**
CYRM-12	Resiliency	12-48	29.0	[26.0, 32.0]	31.1	[28.6, 33.7]	2.1	6.9%	0.019	**0.029**

Footnote: p* = the adjusted p-value following a Benjamini-Hochberg FDR correction used to determine α-critical for each statistical t-test

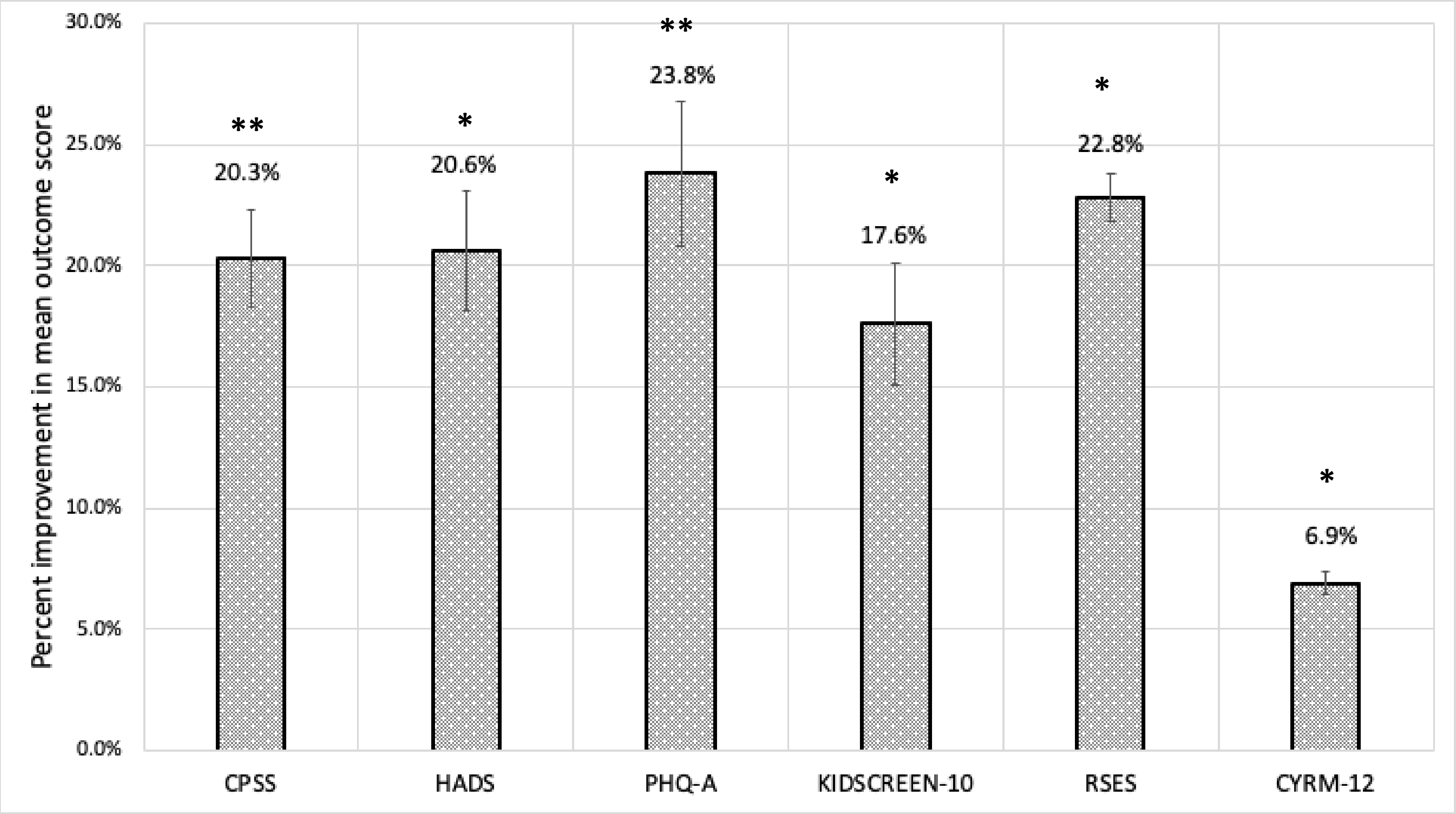
5a.8.3 TABLE 3b. Non-parametric analysis results: Mean change in self-report outcome measures after 2-weeks of an episodic complex multimodal treatment program for adolescent female survivors of child sexual abuse (CSA) (n=27)

Questionnaire	**Domain**	**Range**	**Median Baseline**	**95% CI**	**Median Discharge**	**95 % CI**	**Δ**	**Δ%**	***p***	***p****
CPSS	PTSD	0-51	32	[23, 36]	22	[15, 31]	-10	-31.3%	0.008	**0.012**
HADS	Anxiety	0-21	14	[10, 15]	9	[7, 12]	-5	-35.7%	0.042	**0.013**
PHQ-A	Depression	0-27	16	[13, 18]	13	[7, 14]	-3	-18.8%	0.001	**0.007**
KIDSCREEN-10	Quality of Life	0-44	19	[16, 23]	22	[18, 26]	3	15.8%	0.016	**0.02**
RSES	Self-Esteem	0-30	10	[6, 12]	12	[9, 15]	2	20.0%	0.011	**0.017**
CYRM-12	Resiliency	12-48	29	[25, 32]	31	[28, 33]	2	6.9%	0.024	**0.024**

Footnote: p* = the adjusted p-value following a Benjamini-Hochberg FDR correction used to determine α-critical for each statistical two-tailed Wilcoxon signed-rank test

5a.9 Figures

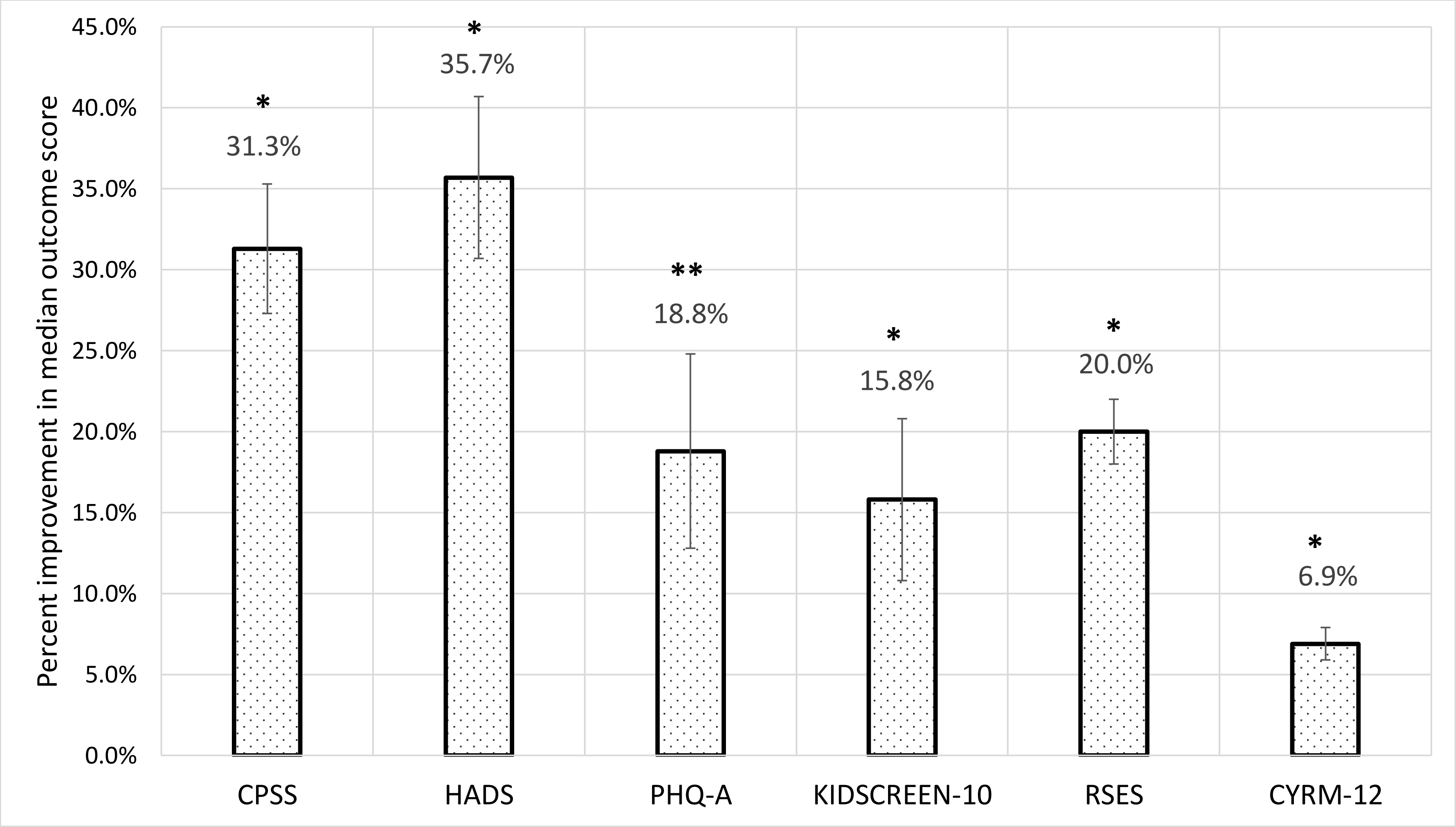
5a.9.1 FIGURE 1a. Parametric Analysis Results: Percentage improvements in mean self-report outcome measure scores for adolescent female child sexual abuse (CSA) survivors undergoing 2-weeks of a complex multimodal treatment program



Footnote: Statistical significance denoted by *(p<0.05), **(p<0.01); variability indicators represent standard error

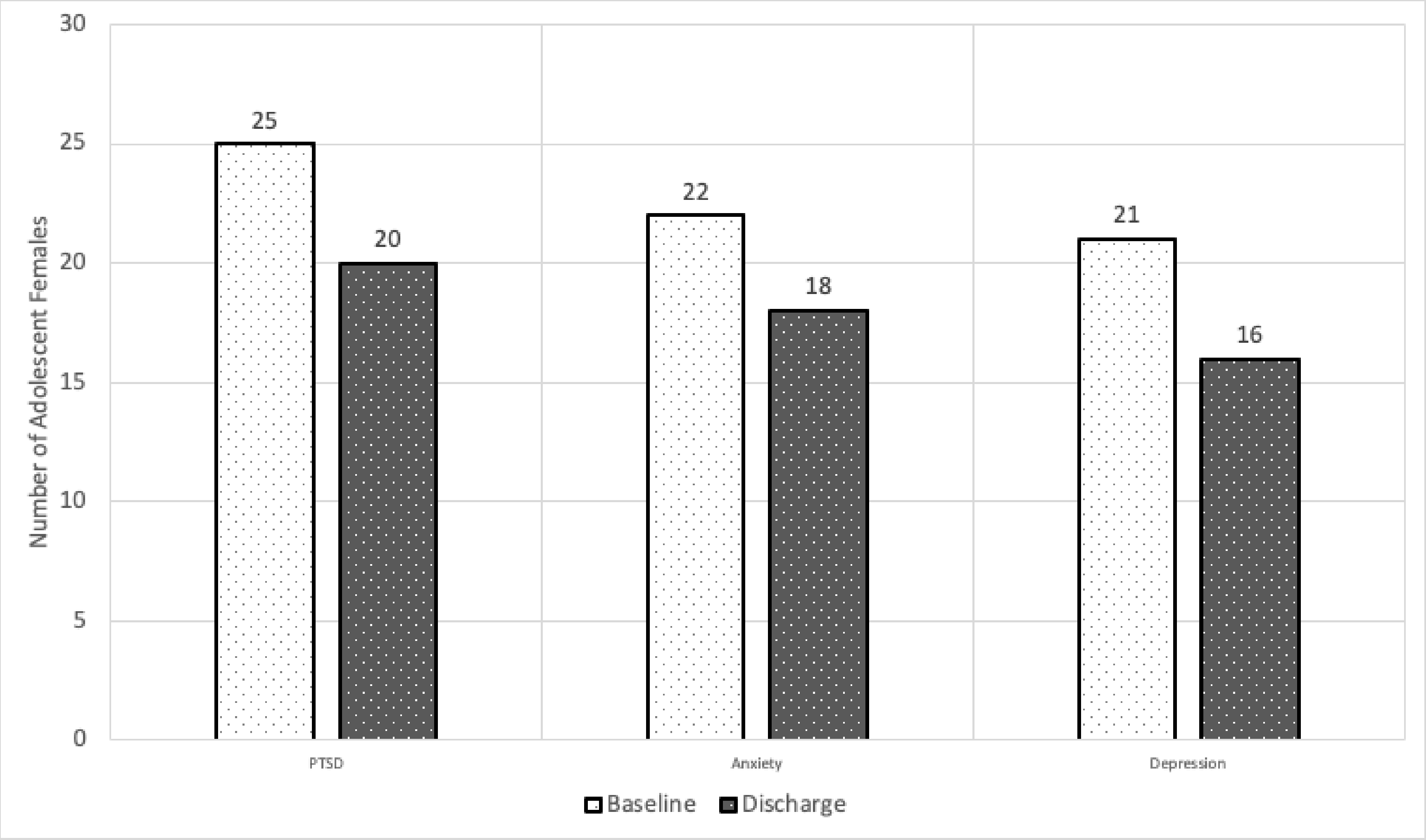
Legend: CPSS—Child PTSD Symptom Scale; HADS—Hospital Anxiety and Depression Scale; PHQ-A (Patient Health Questionnaire (adolescent ver.); KIDSCREEN-10—Quality of Life Index; RSES—Rosenberg Self-Esteem Scale; CYRM-12—Child & Youth Resilience Measure

5a.9.1 FIGURE 1b. Non-Parametric Analysis: Percentage improvements in median self-report outcome measure scores for adolescent female child sexual abuse (CSA) survivors undergoing 2-weeks of a complex multimodal treatment program



Footnote: Statistical significance denoted by *($p<0.05$), **($p<0.01$); variability indicators represent standard error

5a.9.2 FIGURE 2. The number of adolescent female child sexual abuse (CSA) survivors who met the clinical cut-off for a diagnosis of posttraumatic stress disorder (PTSD), anxiety disorder, and major depressive disorder at initial admission (baseline) and discharge after 2-weeks of a complex multimodal treatment program (n=27)



5a.10 Rationale for Further Investigation

The findings of Chapter 5a revealed preliminary evidence that a complex multimodal treatment program for adolescent child sexual abuse survivors is acceptable, safe, and effective. Based on these results, Chapter 5b expands on program assessment by adding three elements to the study design of Chapter 5a:

1. The population under investigation was expanded to include both male and female participants aged 8-12 in order to further assess the potential benefit of the child program

2. Changes in outcomes were measured from baseline to the end of the first and second round of treatment (3-months after initial admission) to investigate longitudinal treatment effects

3. Participants were differentiated based on the time of completion for each of their two treatment rounds. As a result of the COVID-19 pandemic, the Be Brave Ranch was forced to close from March-May, 2020. The unprecedented nature of a global pandemic may have traumatic impacts on vulnerable individuals. Considering the participants in this program are already susceptible to stress, a secondary objective of the subsequent study was to investigate whether the COVID-19 pandemic had an impact on treatment outcomes.

    a. In order to compare pre-COVID and COVID-impacted cohorts (those completing their treatment rounds following May, 2020), some participants from Chapter 5a are included in both chapters.

Chapter 5B: Child sexual abuse survivors: Differential complex multimodal outcomes for pre-COVID and COVID era cohorts

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5b.1 Abstract

Background: Early-life trauma can have widespread psychological impacts on the survivor. Child sexual abuse (CSA) is a form of early-life trauma that affects children and adolescents worldwide. At present, very little research has been done to investigate best-practice evidence-based treatment for youth CSA survivors. In the midst of the current COVID-19 pandemic, it is imperative to investigate the potential impact of added stress on already vulnerable populations.

Objective: The aim of this study was to evaluate the impact of a complex multimodal treatment program on mental health outcomes for youth CSA survivors aged 8-16. Secondary to this, we explored the potential impact of the COVID-19 on clinical presentations of youth and their treatment outcomes.

Methods: Participants of this study were children and youth aged 8-16 who were engaged in a complex multimodal treatment program specifically designed for youth CSA survivors—the Little Warriors Be Brave Ranch. Participants in both the child (8-12 years) and adolescent (13-16 years) programs were asked to complete self-report surveys at initial admission (baseline) and at the end of their first two (of four) treatment rounds. The surveys consisted of validated self-report measures pertaining to: (1) PTSD, (2) depression, (3) anxiety, (4) quality of life, and (5) self-esteem. Both programs were differentiated as either pre-COVID-19 ("pre-COVID" completing treatment prior to March, 2020) or COVID-19-impacted ("COVID-I", completing treatment after May, 2020). Changes in median outcome measure scores were analyzed for statistical significance.

Results: A total of 157 participants were included in this study and the median scores improved for all groups at all timepoints for all five domains; however, the pre-COVID and COVID-I groups differed in their responses. In the child program, statistically significant improvement for the pre-COVID group after round one was reported for depression (-36.6%, p=0.01), anxiety (-26.2%, p=0.008), and self-esteem (16.1%, p=0.05); in the COVID-I group, significant improvement was reported for PTSD (-22.0%, p=0.01), and depression (-21.6%, p=0.031). In the adolescent program, statistically significant improvement was reported in the pre-COVID group after round one for PTSD (-31.3%, p=0.005), depression (-21.4%, p=0.031), anxiety (-31.3%, p=0.007), and self-esteem (20.0%, p=0.048); in the COVID-I group, significant improvement was reported for PTSD (-15.0%, p=0.048) and anxiety (-28.6%, p=0.026). Improvements were generally maintained or increased at the end of round two. In almost every domain, the improvements of the pre-COVID group were greater than those of the COVID-I group.

Conclusion: A complex multimodal treatment program specifically designed for youth CSA survivors has the capacity to improve a number of relevant determinants of mental health and well-being. The COVID-19 pandemic appears to have increased the youth's initial presenting clinical concerns and decreased the benefits of the program. The COVID-19 pandemic may have had an added impact on individual stress levels, or potentially induced retraumatization, that may have resulted in treatment resistance and should be considered in the context of treating vulnerable population.

5b.2 Introduction

Psychological trauma occurs when an individual endures (or perceives) a stressful event—or series of events—that overwhelms their capacity to mentally cope and adapt. Traumatic experiences have been shown to induce long-term negative psychological changes in survivors; this is particularly true for survivors of childhood trauma[1,2]. Defining psychological trauma remains an ongoing issue, as individuals differ not only in their traumatic experiences, but also in how they respond to those stressors[3,4]. Childhood maltreatment and early-life trauma fall under the umbrella of Adverse Childhood Experiences (ACE). In adults, a history of ACE has been associated with deleterious long-term outcomes, including increased likelihood of developing chronic and infectious diseases, decreased vocational and occupational success, engagement in risky behaviors such as unprotected sex or substance abuse, and increased susceptibility to post-traumatic stress disorder (PSTD), depression, anxiety, self-harm, suicidal ideation and suicide attempts[5,6].

Child sexual abuse (CSA) is a common ACE that impacts children and adolescents worldwide. There is no currently established overall prevalence for CSA, but global estimates in developed nations approximate that over 8% of males and 16% of females will experience at least one significant episode of CSA prior to adulthood[7-11]. In Canada, rates have been estimated as high as 10% in males and 20% in females[12,13]. Notably, variability in reporting, access to services, and rates of disclosure suggest that the prevalence of CSA is likely underestimated and may be as high as 30% in females and 23% in males[14,15]. Variability in reporting may also be related to heterogeneity in the definition of CSA, which can include a diverse set of sexually-related behaviors such as: (1) unwanted exposure to pornography, genitalia, or sexual acts; (2) child exploitation or grooming; (3) oral-genital contact; (4) attempted intercourse, and (5) penetration[16-18].

CSA has been associated with a number of psychological challenges for survivors; among these the most common are PTSD, depression, anxiety, and behavioural problems[19-22]. CSA survivors are more likely to experience trauma-related mental health issues as compared to individuals with other types of early-life trauma[23,24]. Several non-pharmacological treatment options appear to be effective in treating CSA survivors, but the effectiveness of these modalities in improving desired outcomes has only been minimally assessed. Cognitive Behavioural Therapy (CBT), particularly trauma-focused CBT (tf-CBT), may be the most impactful monotherapy for CSA-related PTSD, depression, and anxiety[17,25]. Other modalities, including group therapy[26,27], animal-assisted therapy[28,29], play therapy[30], eye movement desensitization and reprocessing (EMDR)[31,32], art therapy[33], and recreational therapy[33,34], may also result in positive outcomes. Evidence suggests that combination (i.e., multimodal) therapy (e.g., tf-CBT + play therapy + supportive therapy) is superior to any particular monotherapy in treating this population[35].

A major challenge to developing a "gold-standard" for treating CSA is the diversity of experiences between individuals and the way in which this heterogeneity of trauma history manifests psychologically. In a trauma-focused approach, a successful outcome depends on a survivor's capacity to create a mental construction of the trauma and ultimately develop a trauma narrative[36]. Creation of a trauma narrative is generally mediated through gradual exposure methods which aim to ease the survivor towards confronting and reprocessing traumatic memories. To accomplish this, individuals under treatment must have the capacity to emotionally regulate and mentally process their incident(s)[17]. The Neurosequential Model of Therapeutics (NMT), as outlined by Perry (2006)[37], suggests a "bottom-up" approach, in which anatomically lower-level brain networks (i.e., autonomic and limbic circuits) are treated first. This allows the survivor to develop the emotional regulation required to effectively access the psychological pathways targeted through tf-CBT. Preliminary evidence suggests that combining the NMT with a multimodal treatment regimen may have the capacity to improve psychological outcomes and well-being in adolescent female CSA survivors[38].

At present, a major factor relevant to the treatment of CSA survivors is the psychological impact of the ongoing COVID-19 pandemic. Pandemics induce immediate instability in daily-life and have been shown in the past to have psychological impacts on individuals who have lived through them[39-41]. Many experts have expressed concern about the potential consequences the COVID-19 pandemic has on children and adolescents; this includes an increase in reports of child physical and sexual abuse[42,43], as well as higher incidences of child sex trafficking, child pornography, and online sexual exploitation—especially as youth are spending more time online and on social media[44-47]. For children, the closure of schools leads to separation from friends and peer groups;

this can cause increased stress, loneliness, depression, and feelings of isolation[48-50] and has been associated to declines in physical and mental health[51]. Adolescents appear to be particularly impacted by the effects of the COVID-19 pandemic[52]. A systematic review assessing mental health outcomes in youth impacted by the COVID-19 pandemic found the highest levels of depression and anxiety in adolescent populations, particularly in females aged 12-18[53]. As such, it is essential for trauma-focused treatment programs to acknowledge the potential compounding impact lockdowns, school closures, and the stress of a pandemic are having on already vulnerable populations.

5b.2.1 Primary Objective

The primary aim of this study is to assess the impact of a novel complex multimodal treatment program specifically aimed at treating youth CSA survivors. By analyzing changes in self-report outcome measures in a number of domains related to mental health and well-being, this study intends to provide a preliminary assessment of this program at treating both children and adolescents with a history of CSA. Further to this, we aimed to evaluate the impact the COVID-19 pandemic has had on this population by comparing reported outcomes between participants who completed their treatment before and after the onset of the COVID-19 pandemic.

5b.3 Methods

5b.3.1 Ethics Approval

This second-level independent analysis of previously collected, and fully anonymized, data was approved by the University of Alberta Human Research Ethics Committee (Ethics review number: Pro00089614).

5b.3.2. Study Design

The primary objective of this analysis was to assess the impact of a novel treatment program for CSA survivors in improving mental health and well-being. Secondarily, we aimed to assess the impact the COVID-19 pandemic had on any treatment effects. The analysis was conducted on data collected as part of routine care at a facility dedicated to specifically treat child and adolescent survivors of CSA. As standard procedure, self-report surveys are administered to the participants at admission and discharge from each round of treatment. This study includes data collected between January 2019 – October 2021. Data collected from the surveys was anonymized and sent to a third-party server to be encoded and subsequently sent to researchers for a secondary independent analysis of the collected information.

5b.3.2.1 Treatment Program

Treatment took place at a community care facility known as the Little Warriors "Be Brave Ranch" (BBR). The BBR is a charitable, not-for-profit organization designed to specifically treat children and adolescent survivors of CSA. The BBR consists of two programs: (1) The child program – designed for CSA survivors aged 8-12; (2) The adolescent program – designed for CSA survivors aged 13-16. Both programs consist of four intensive treatment rounds that are spread out over the course of one year. All treatment rounds are 12-days in duration, with the exception of the first round of child program which consists of a 28-day stay.

The BBR is located in a semi-rural area outside of Edmonton, Canada. The facility consists of a number of communal lodges to accommodate the children and provide a more naturalistic and "camp-like" feel. There are a number of advanced security features designed to provide safety for both children and staff, including a 24-hour security-guarded gate, a secured fence, security cameras, and a confidential location. The facility has been intentionally designed to exceed all required safety and regulatory guidelines, is appropriately licensed, and is assessed regularly by all appropriate authorities.

5b.3.2.2 Participants

Admission into the program is based on an initial screening interview conducted by staff at the BBR. Participants for both the child and adolescent program were required to meet the following inclusion criteria:

- Appropriate age for the specific program
- Psychologically minded and able to benefit from therapy
- IQ > 80 as determined by previous assessments
- Medically stable and compliant with medications
- Child has disclosed abuse to at least one adult/caregiver
- Family/caregiver is identified and involved
- Completion of a readiness assessment

5b.3.2.3 Program Design

The intensive multimodal treatment program includes weekly exposure to a suite of therapeutic approach, comprised of the following techniques:

11. Trauma-Focused Cognitive Behavioural Therapy (tf-CBT)
12. Group Therapy
13. Individual Therapy
14. Eye Movement Desensitization and Reprocessing (EMDR)
15. Yoga and Meditative Therapy
16. Art Therapy
17. Music Therapy
18. Cultural Activities
19. Recreational Therapy
20. Animal-Assisted Therapy

The allocation of these therapies follows a general schedule that differs based on which round of treatment the participants are attending. The program is specifically designed to allow for some individual variation in the program in order to focus particular therapies for selected individuals who may benefit more from a regimen that emphasizes one specific treatment modality over another. The exact set of treatments was determined by the therapy team following regular (usually daily) on-site meetings. The therapeutic framework for the program is modelled after the Neurosequential Model of Therapeutics (NMT)[37]. The first round of treatment (28-days for the children, 12-days for the adolescents) has a heavier emphasis on those treatment options that specifically target the development of lower level networks such as play, music, animal-assisted, recreational/sport, and art therapy. It should be noted while the entire program is centered around a trauma-focused approach, the weight of tf-CBT within the treatment regimen expands over the course of treatment and is thus under-represented in the first half of the program as compared to the later rounds of treatment. Earlier treatment rounds emphasize emotional regulation/sensory somatic work and therapeutic milieu.

During their stay at the BBR, each participant is administered a daily comprehensive schedule that always included some level of tf-CBT. This approach involves the following four components: (1) skill-building phase aimed at improving cognitive, affective, behavioural and biological self-regulation; (2) intentional gradual exposure to the child's trauma in a safe, careful, and controlled manner; (3) cognitive processing of the child's personal traumatic incident as achieved through the construction of a trauma narrative; (4) combined child-caregiver sessions and safety planning to develop closure, a combined approach which has preliminarily been shown to have lasting positive effects for this population[54]. Apart from direct therapy, the participants are also scheduled for a number of recreational activities that were designed to make the program more exciting and help to build social relationships and trust. Each activity is properly supervised and carried out under a detailed plan linking them to therapy goals. Roughly six hours each day are allocated to structured activities, with the remainder of the day being reserved for free time and meals.

5b.3.3 Data Collection

Self-report surveys were administered electronically via tablets at initial admission (baseline) and again at discharge of each treatment round. The present study includes data collected from the first two rounds of treatment for both programs. All data is collected and anonymized by a third party server and then provided to the research team for further evaluation. For many of the outcome measures, the answer options are given on a Likert-scale. To make this less complicated for the children, a slider-bar was implemented into the survey to add a visual effect that intended to help the child accurately convey their answers and increase their engagement. Surveys ask basic demographic and environmental questions (e.g., involvement with peer groups, community programs, etc.), followed by several clinically validated self-report child psychiatric outcome measures to assess (1) PTSD, (2) depression, (3) anxiety, (4) quality of life, and (5) self-esteem. Questionnaire scores at each timepoint were compared to assess whether or not symptom improvement occurred in a variety of domains for mental health domains.

As a result of the COVID-19 pandemic, the BBR was forced to close between March-May 2020. For study purposes, participants data was differentiated based on whether treatment had completed prior to, or after the onset of the COVID-19 pandemic. Pre-COVID participants were those who completed their treatment rounds prior to March 2020; COVID-impacted (COVID-I) participants were those who completed their treatment rounds following May, 2020. Those participants who began their first treatment following this break were given a COVID questionnaire which contained six questions asking the participant how much the COVID-19 pandemic had impact certain aspects of their lives (See Appendix A for "Assessment Details").

5b.3.3.1 Statistical Analysis

To assess the change in median questionnaire scores over time, non-parametric Wilcoxon signed-rank test were carried out between baseline and the end of round one for those who completed the first treatment round, as well as between baseline and the end of round two for those who completed the second treatment round. To determine statistical differences in the response distribution of the COVID-19 questionnaire between the two programs, a non-parametric Kolmogorov-Smirnov test for distribution was used. For all statistical tests, a critical value of p=0.05 was used. Due to the number of comparisons in this study, a false discovery correction method—the Benjamini-Hochberg method—was used to appropriately manage Type I errors. Only results whose adjusted p-value remained below the critical alpha level were considered statistically significant.

5b.4 Results

5b.4.1 Participants

In total, 151 participants completed at least one round of treatment and were included in this study. Eighty-two (54.3%) attended the child program and 69 (45.7%) attended the Adolescent Program. Participant demographics summarized in Table 1.

Insert **TABLE 1** here

5b.4.1.1 Child Program

The mean age of the 82 participants in the child program was 10.7 (1.3) years (range 8-12) at baseline. The average age of the pre-COVID cohorts was slightly older (10.9 (1.3) years) than that of the COVID-I cohorts (10.4 (1.3) years). The majority of participants were in grade five (20.7%) or six (31.7%). Fifty-seven (69.5%) of the participants were biologically female and 25 (30.5%) male. In terms of gender identity, 46 (56.1%) identified as female, 22 (26.8%) identified as male, and 14 (17.1%) identified as non-binary. Over a third of participants (36.6%) identified as an Indigenous Canadian.

5b.4.1.2 Adolescent Program

The mean age of the 75 participants in the adolescent program was 14.3 (1.4) years (range 13-17) at baseline. The average age of the pre-COVID cohorts was slightly younger (14.1 (0.9) years) than that of the COVID-I cohorts (14.3 (1.5) years). The majority of participants were in grade nine (34.7%) or ten (30.7%). Seventy-one (94.6%) of the participants were biologically female and four (5.4%) were male. In terms of gender identity, 61 (81.3%) identified as female, four (5.4%) identified as male, and ten (13.3%) identified as non-binary. Two-fifths of participants (40.0%) identified as an Indigenous Canadian/American.

5b.4.2 Environmental Questionnaire

5b.4.2.1 Child Program

Results from the Little Warriors Environmental Questionnaire are summarized in Table 2. In total, the questions receiving the highest level of agreement were "feeling safe in my home" (89.0%) and "having an adult I can trust" (89.0%). The fewest number of participants reported engaging in activities outside of school (e.g., sports teams, organizations, clubs, etc.) (68.3%), and interacting with friends outside of school (72.0%). A smaller proportion of the pre-COVID participants reported engaging in extra-curricular activities than those in the COVID-I cohorts (81.6% and 56.8%, respectively). When asked about their traumatic event(s), sixty-two (75.6%) participants reported feeling believed upon disclosing their CSA; sixty (73.2%) reported feeling supported, and sixty-three (76.8%) felt that it had been acted on properly. A larger proportion of the pre-COVID cohorts reported feeling supported as compared to the COVID-I cohorts (86.8% and 61.4%, respectively).

5b.4.2.2 Adolescent Program

Of the 69 adolescent participants, the questions receiving the highest agreement rate were "feeling safe in my home" (93.3%) and "having my own bedroom" (93.3%). The fewest number of participants reported "engaging in activities outside of school" (46.7%), and interacting with friends outside of school (73.3%). A smaller proportion of participants reported "socializing with friends outside of school" in the COVID-I cohorts (64.3% vs. 84.8% pre-COVID) as well as "engaging in extra-curricular activities" (54.8% vs. 66.7 pre-COVID). When asked about their traumatic event(s), fifty-one (68.0%) reported feeling believed upon disclosing their CSA; fifty-three (70.7%) reported feeling supported, and only thirty-five (46.7%) felt that it had been acted on properly. A larger proportion of the pre-COVID cohorts reported feeling believed as compared to the COVID-I cohorts (84.8% and 54.8%, respectively).

Insert **TABLE 2** Here

5b.4.3 Survey Results

Changes in median questionnaire scores are summarized in Table 3. Each program was divided into 4 groups based on: (1) Treatment Round (baseline to end of round one vs. baseline to the end of round two); (2) COVID-impacted (those participants who completed their treatment rounds prior to- vs. following the onset of the COVID-19 pandemic. Reductions in median PTSD, depression, and anxiety measures were considered improvements; increases in median self-esteem and quality of life were considered improvements. Overall, participants reported positive improvements in every single measured domain at the end of both treatment rounds; this was true for both pre-COVID and COVID-I cohorts.

Insert **TABLE 3** here

5b.4.3.1 Child Program

5b.4.3.1.1 Overall Survey Results

Improvements in median scores are summarized in Table 3 and Figure 1. The largest change reported after the first treatment round in the child program was in depression (-36.6%, p=0.01)[†]; a change in median score of 20.5 at baseline to 13 at the end of treatment round one. Improvement in median depression scores was also the largest in round two, but was not statistically significant (-34.1%, p=0.14). For treatment round one, statistically significant changes in the pre-COVID cohorts were reported for depression (-36.6%, p=0.01) and anxiety (-26.2%, p=0.008); for the COVID-I cohorts, significant changes in round one were reported for PTSD (-22.0%, p=0.01) and depression (-21.6%, p=0.031). For treatment round two, significant changes in the pre-COVID cohorts were reported in the PTSD (-20.4%, p=0.05); for the COVID cohorts, significant changes in round two were reported in the depression (-27.3%, p=0.048).

[†] Note: all p-values are adjusted via the Benjamini-Hochberg false discovery rate correction method

In comparison to the COVID-I cohorts, the improvements reported in the pre-COVID cohorts were greater in almost every domain—this is true for both rounds of treatment. The only reported improvements that were greater in the COVID-I cohorts were: (1) Anxiety changes in treatment round 2 (pre-COVID: 22.9% p=0.13; COVID-I: 25.0%, p=0.18) and (2) self-esteem changes in treatment round 2 (pre-COVID: 3.1%, p=0.88; COVID-I: 11.8%, p=0.36).

Insert **FIGURE 1** here

5b.4.3.1.2 PTSD

In both the pre-COVID and COVID-I cohorts, there was a reduction in median CPSS scores for both treatment rounds. The median baseline CPSS score was higher for the COVID-I cohorts (29.5 – *moderately severe*) as compared to the pre-COVID cohorts (25 – *moderate*). The largest improvement was reported for pre-COVID round one (-26.0%, p=0.083). Statistically significant changes were found for pre-COVID round two (-20.4%, p=0.05), and COVID-I round one (-22.0%, p=0.01).

5b.4.3.1.3 Depression

In both the pre-COVID and COVID-I cohorts, median RCADS-D scores were reduced at both timepoints. The median baseline RCADS-D score was higher in the pre-COVID cohorts (20.5 and 18.5, respectively). Statistically significant improvements were reported at pre-COVID round one (-36.6%. p=0.01), COVID I round one (-21.6%, p=0.031), and COVID-I round two (-27.3%, p =0.048). Improvements in depression scores were higher for the pre-COVID cohorts at both timepoints.

5b.4.3.1.4 Anxiety

Median RCADS-A improved at all timepoints for both groups. The median baseline RCADS-A score was higher for the COVID-I cohorts than for pre-COVID (23 and 21, respectively). Statistically significant reductions were only reported at pre-COVID round one (-26.2%. p=0.008).

Improvements in anxiety scores were higher in the pre-COVID cohorts for round one, but were greater for the COVID-I cohorts in round two.

5b.4.3.1.5 Quality of Life

Improvements in median KIDSCREEN-10 scores were reported at all time points; however, none of the changes were statistically significant. The largest improvement was reported at pre-COVID round two (13.0%, p=0.36). Improvements in KIDSCREEN scores were greater at both time points for the pre-COVID cohorts.

5b.4.3.1.6 Self-Esteem

Improvements in median RSES scores were reported at all timepoints; however, none of these changes were statistically significant. The largest improvement was reported by the pre-COVID cohorts in round one (16.1%, p=0.05). Changes in RSES scores were greater for the pre-COVID group at the end of round one but were higher in the COVID-I cohorts at the end of round two.

5b.4.3.2 Adolescent Program Results

5b.4.3.2.1 Overall Survey Results

Improvements in median scores are summarized in Table 3 and Figure 2. The largest improvement at the end of round one was reported PTSD and anxiety for the pre-COVID participants (-31.3%, p=0.005; -31.3%, p=0.007, respectively). The largest change reported after the second round of treatment was reported anxiety for the pre-COVID participants (-38.9%, p=0.024). For treatment round one, statistically significant changes in the pre-COVID cohorts were reported for PTSD (-31.3%, p=0.005), depression (-21.4%, p=0.031), anxiety (-31.3%, p=0.007), and self-esteem (20.0%, p=0.048). For the COVID-I cohorts, statistically significant changes were reported in round one for the PTSD (-15.0%, p=0.048) and anxiety (-28.6%, p=0.026). For treatment round two, statistically significant changes in the pre-COVID cohorts were reported in the PTSD (-28.1%, p=0.031) and anxiety (-38.9%, p=0.024); for the COVID-I cohorts, there were no statistically significant improvements.

In comparison to the COVID-I cohorts, the improvements reported in the pre-COVID cohorts were greater for all domains at each timepoint.

Insert **FIGURE 2** Here

5b.4.3.2.2 PTSD

For both groups there was a reduction in median CPSS scores at both treatment rounds. The median baseline CPSS score was higher for the pre-COVID participants (32 – *severe*) than the COVID-I participants (30 – *moderately severe*). The largest improvement was reported for pre-COVID round one (-31.3%, p=0.005). Statistically significant improvements were also reported for pre-COVID round two (-28.1%, p=0.031), COVID-I round one (-15.0%, p=0.048), and COVID-I round two (-25.4%, p=0.041).

5b.4.3.2.3 Depression

In both groups median PHQ-A scores improved at both timepoints. The median baseline PHQ-A score was higher in the pre-COVID cohorts than the COVID-I cohorts (16 and 12.5, respectively). Statistically significant reductions were reported for pre-COVID round one (-21.4%. p=0.031). Improvements in the COVID-I cohorts were not statistically significant, and were lower than the pre-COVID cohorts at both timepoints.

5b.4.3.2.4 Anxiety

In both groups median HADS scores improved at both timepoints. The median baseline HADS scores were higher for the pre-COVID and COVID-I cohorts (16 and 14, respectively), though both scores fall into the *Abnormal/High* category. Statistically significant reductions were reported for pre-COVID round one (-31.3%, p=0.007), pre-COVID round two (-38.9%, p=0.024), and COVID-I round one (-28.6%, p=0.026). Improvements in anxiety scores were higher for the pre-COVID cohorts at both timepoints.

5b.4.3.2.5 Quality of Life

Improvements in median KIDSCREEN-10 scores were reported at all time points. Statistically significant improvements were not found at any timepoint. Changes in KIDSCREEN scores were greater at both time points for the pre-COVID cohorts.

5b.4.3.2.6 Self-Esteem

Improvements in median RSES scores were reported at all timepoints. Statistically significant changes were reported for pre-COVID round one (20.0%, p=0.048). Changes in RSES scores were greater for the pre-COVID group at both timepoints.

5b.4.4 COVID-19 Questionnaire

The results of the COVID-19 Questionnaire are summarized in Figures 3 & 4. In the child program, the highest level of agreement was reported for question 2: “Social distancing has made me feel disconnected from friends and/or family”; 18 (40.9%) strongly agreed with this statement and 7 (15.9%) agreed. The highest level of disagreement was reported for question 3: “I spend a lot of time worrying about the COVID-19 pandemic”; 18 (40.9%) strongly disagreed with this statement and 15 (34.1%) disagreed. In the teen program, the highest level of agreement was reported for question 2 (11 (26.2%) strongly agreed, 16 (38.9%) agreed) and question 6: “The COVID-19 pandemic has increased the amount of time I spend on electronic devices”; 15 (35.7%) strongly agreed and 11 (26.2%) agreed. The highest level of disagreement was reported for question 3 (7 (16.7%) strongly disagree, 12 (28.6%) disagree).

For every question, the median adolescent participant response was either equal to or greater than those of the child program, indicating a higher reported level of impact from the COVID-19 pandemic. Statistically significant differences in response distribution were only found for questions 3 (p=0.044).

Insert **FIGURES 3** & **4** here

5b.5 Discussion

The purpose of this study was to independently assess the potential impact of an evidence-based complex multimodal treatment program specifically designed to treat youth Child Sexual Abuse (CSA) survivors aged 8-16. The results supported our hypothesis that both children and adolescents would report improvements in PTSD, depression, anxiety, quality of life, and self-esteem after the initial round of treatment. The results further suggest that these initial benefits are sustained following a second round of treatment. Although preliminary, the findings of this analysis support the benefits of a complex multimodal treatment program for this population, irrespective of pandemic experience. Secondarily, the results of this study suggest that the onset and consequences of the COVID-19 pandemic may interfere with the impact of treatment, as evidenced by a reduction in reported outcome improvements in participants who began their treatment following the onset of the pandemic.

5b.5.1 Impact of Treatment Program on CSA

At all timepoints measured in this study, self-reported symptoms of PTSD showed significant and sustained improvements. Considering over a third of CSA survivors experience some form of PTSD in their lifetime[55], a sustainable reduction in PTSD and other trauma-related symptoms is an essential marker of treatment effectiveness. However, it is important to emphasize that the effects of CSA are heterogenous and depend on the intrinsic characteristics of the victim, the identity of the offender and their relationship with the victim, as well as the severity, frequency, and duration of the abuse[18,56,57]. As such, treatment programs specifically designed for young CSA survivors are more likely to provide benefit if it employs a variety of therapeutic tools and strategies. The evidence for this can only be assessed through the implementation of validated outcome measures that assess a variety of relevant domains. At all timepoints, children and adolescents consistently reported improvements in depression, anxiety, quality of life and self-esteem, which helps to strengthen the evidence of positive treatment effect for this population.

There is evidence that tf-CBT may be the best treatment option for traumatized youth[17,25]; however, the results of the study suggest that tf-CBT is most effective when supplemented with a variety of treatment options. Because the successful development of a trauma narrative is so essential to trauma-focused therapy, those individuals who have the capacity to emotionally regulate are more likely to benefit from this type of therapy[36]. Schore (2001)[58] suggested that the development of a trauma narrative through tf-CBT is mediated by a reduction in right hemispheric activity in the brain, which is often overactive in individuals with emotional/limbic dysregulation. The development of a trauma-narrative through gradual exposure may activate left hemispheric linguistic centers, effectively reducing right hemispheric activity while offering the victim the opportunity to verbalize their traumatic memories and fears.

5b.5.2 The Impact of the COVID-19 Pandemic

A secondary finding of this study was the impact of the COVID-19 pandemic on the benefits of the treatment program. In comparison to the participants that completed their treatment round(s) prior to the onset of the pandemic, children and adolescent that began treatment after the onset of the pandemic consistently reported lower levels of improvement. Collective traumas, such as natural disasters or pandemics, have the capacity to retraumatize already vulnerable populations[59], and may explain some of the differences in treatment outcomes observed. Social distancing, lockdowns, school closures, and a public health crisis has the potential to increase individual stress levels[48,49] which could result in treatment resistance. In both programs, there was a noticeable reduction in reported improvements in PSTD, depression, and anxiety, although the differences in anxiety for the child program were less pronounced. PTSD, depression, and anxiety are linked to stress, which is primarily mediated through the Hypothalamic-Pituitary-Adrenal (HPA) axis. Early-life stress has been linked to heightened HPA axis hyperactivity[60], as well as epigenetic modifications of the genes responsible for HPA axis regulation[61]. As such, the compounding impact of a pandemic on youth already susceptible to stress dysregulation may be responsible for the reduction in reported improvements; this may be particularly true for adolescents[53]. The impact of the pandemic may also be inducing added stress on the caregivers of these children and adolescents, which is crucial considering how parental stress has been associated with behavioural problems in children[62,63]. A recent review on the impact of the COVID-19 pandemic revealed that caregivers with higher stress loads are more susceptible to increased alcohol and drug consumption, putting further strain on the family unit[64].

The findings of the COVID Questionnaire suggests that adolescents attending the program have felt a larger impact of the pandemic as compared to the younger participants. A majority of both the children and adolescents reported feeling more disconnected from friends and family and spending more time on electronic devices. The rising influence of social media has been associated with an increase in mood disorders in youth, particularly adolescent females[65]; this may partially explain some of the treatment resistant effects seen in the COVID-I groups. Disconnection from peer groups also reduces interactions with social support networks, which have been shown to be significant mediators in the management of mental health and quality of life[66]. Adolescent participants were also more likely to report increased family conflict, which may account for some of the differences in outcomes for the two programs. It is possible that “stay-at-home” orders, which have increased interaction time between parents and their children, has been beneficial for younger children; inversely, more interaction between adolescents and parents—coupled with decreased socialization with peer groups—may be increasing family conflict and further adding to their overall stress in older participants. Finally, the majority of participants reported experiencing higher than normal levels of anxiety and stress, which is in line with reports from other studies surveying the impact of the COVID-19 pandemic on youth[67,68]. Interestingly, the majority of children and adolescents disagreed (or were neutral) on the proposition that they spent a lot of time worrying about the pandemic. Considering the noticeable effect the pandemic had on reported improvements from treatment, this finding could suggest that the stressful impact of the pandemic is unconsciously experienced and may manifest in other forms, such as intrafamilial conflict.

5b.5.3 Cultural Considerations

One notable finding of this analysis was that over a third of the children and adolescents seen in the program identified as Indigenous Canadian. Preliminary research investigating the prevalence of CSA in Canadian Indigenous populations have reported rates of 20-25%, and there is evidence suggesting Indigenous youth are at a higher risk for CSA than their non-Indigenous counterparts[69]. Further to this, Indigenous CSA survivors are more likely to be younger at the time of their abuse and are more likely to experience serious forms of CSA[70]. Considering Indigenous youth are already at an elevated risk for PSTD, depression, substance abuse, and suicide[71], it is imperative that an effective treatment program for these populations exists. The BBR utilizes cultural linkages and attempts to infuse Indigenous values and beliefs into the program to further amplify the positive effects of the program and make these individuals feel comfortable. This includes traditional sweat lodge ceremonies, smudging, traditional teaching, and involvement of local Elders.

5b.5.4 Limitations & Future Considerations

There several limitations to this analysis that may reduce the generalizability of the findings. Most significantly, this was a secondary analysis of data collected by an independent organization, it was not a clinical research study, and there was no comparison group. Without a comparison group, it is difficult to confidently attribute the reported improvements in mental health and well-being solely to the treatment program. We propose that future research should include a treatment-as-usual comparison group in order to fully elucidate the effects specifically attributed to treatment. Further to this, it is possible that some of the positive effects were a result of individuals staying in a highly supportive location with individuals who have had similar experiences, and that the benefits seen were non-specific benefits from the environment rather than the program therapies specifically. However, since the creating a hospitable environment is an intentional characteristic of the program, any benefits from this part of treatment may be difficult to tease out. It should be noted that these results only encapsulate half of the entire treatment program, which consists of four treatment rounds over the course of 12-months. The purpose of this study was to provide evidence-based justification for further program assessment. Secondly, because data was collected entirely from self-report questionnaires, it is possible that the results are not entirely accurate in reflecting the true degree of symptom severity. Using clinician-rated measures or qualitative interviews to supplement these self-report measures could ensure more accurate data collection and correct for outliers or errors. Thirdly, differences in outcome improvements between groups were not statistically compared. The data analysis strategy relied on multiple group comparisons, and the researchers determined that increasing the number of comparisons would reduce the validity of the statistical analysis. As the primary objective of this research was to assess the impact of the program on mental health outcomes, and not to determine the differences between COVID-impacted and non-impacted groups, a narrative approach was considered appropriate, with the caveat that these findings are only meant to guide future research. Finally, considering the significant proportion of children treated who identified as Indigenous Canadian, it would be useful for further research to carry out a sub-analysis on this population in order to determine whether or not Indigenous children receive greater or lesser benefit from the program than their non-Indigenous peers.

5b.5.5 Conclusion

The results of this study provide preliminary evidence that a multimodal treatment program specifically designed for youth CSA survivors has the capacity to provide widespread improvements in essential determinants of mental health and well-being. In both the child and adolescent programs, participants reported improvements in every domain under investigation after their first round of treatment. For those who underwent two treatment rounds, these positive improvements were maintained. However, considering this assessment was limited to the first half of the program, it’s difficult to determine whether the outcomes reported were a result of acute treatment effects and whether these improvements are sustainable long-term. Further assessment of the entire program will help support the findings of this study. Second, the findings of this study revealed a decrease in reported improvements for those participants who began their treatment after the onset of the COVID-19 pandemic. This may suggest that the consequences of a global pandemic, including lockdowns, school closures, social distancing, and fear of illness, may exacerbate the effects of trauma and/or reduce the benefit of the therapy program. As such, the potential compounding impact that a global pandemic may have on traumatized individuals should be considered when treating this population.

5b.6 References

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5b.7 Additional Information

5b.7.1 Declaration of Interest

The author(s) declare no potential conflicts of interest with respect to research, authorship, or publication of this article.

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5b.7.4 Author Contribution

All authors made significant intellectual contributions to this manuscript. Research questions, study design and research methods were developed by MR, HP, WP, and PS, with expertise and consultation provided by AG, VA, GH, YW, and LS. Manuscript was written primarily by MR, with assistance from HP and PS. Data was collected and statistically analyzed by MR with the assistance of input from PS, HP, and AG. All authors contributed to the editorial process and approved the final version of this manuscript.

5b.8 Tables

5b.8.1 TABLE 1. Demographic information for participants in a multimodal treatment program designed for youth child sexual abuse survivors aged 8-16. Pre-Covid participants underwent their treatment round(s) prior to March, 2020; Covid impacted participants underwent their treatment round(s) following May, 2020.

Child Program		Pre-Covid (n=38)	Covid Impacted (n=44)	Total (n=82)
Mean age (years)		10.9 ± 1.3	10.4 ± 1.3	10.7 ± 1.3
Grade				
	3	4 (10.5%)	4 (9.1%)	8 (9.8%)
	4	6 (15.8%)	7 (15.9%)	13 (15.9%)
	5	5 (13.2%)	12 (27.3%)	17 (20.7%)
	6	13 (34.2%)	13 (29.5%)	26 (31.7%)
	7	6 (15.8%)	7 (15.9%)	13 (15.9%)
	8	4 (10.5%)	1 (2.3%)	5 (6.1%)
Sex				
	M	16 (42.1%)	9 (20.5%)	25 (30.5%)
	F	22 (57.9%)	35 (79.5%)	57 (69.5%)
Gender Identity				
	M	15 (39.5%)	7 (15.9%)	22 (26.8%)
	F	20 (52.6%)	26 (59.1%)	46 (56.1%)
	Non-binary	3 (7.9%)	11 (25.0%)	14 (17.1%)
Identify as Indigenous		14 (36.8%)	16 (36.4%)	30 (36.6%)

Adolescent Program		Pre-Covid (n=33)	Covid Impacted (n=42)	Total (n=75)
Mean age (years)		14.1 ± 0.9	14.3 ± 1.5	14.3 ± 1.5
Grade				
	7	1 (3.0%)	5 (11.9%)	6 (8.0%)
	8	6 (18.2%)	6 (14.3%)	12 (16.0%)
	9	13 (39.4%)	13 (31.0%)	26 (34.7%)
	10	12 (36.4%)	11 (26.2%)	23 (30.7%)
	11	1 (3.0%)	7 (16.7%)	8 (10.6%)
Sex				
	M	0 (0%)	4 (9.5%)	4 (5.4%)
	F	33 (100%)	38 (90.5%)	71 (94.6%)
Gender Identity				
	M	0 (0%)	4 (9.5%)	4 (5.4%)
	F	29 (87.9%)	32 (76.2%)	61 (81.3%)
	Non-binary	4 (12.1%)	6 (14.3%)	10 (13.3%)
Identify as Indigenous		11 (33.3%)	19 (45.2%)	30 (40.0%)

5b.8.2 TABLE 2. Number of participants who answered "Yes" to questions in the Environmental Questionnaire designed for youth child sexual abuse survivors aged 8-12 undergoing a multimodal treatment program. Participant answers were recorded at initial admission (baseline). Pre-Covid participants underwent their treatment round(s) prior to March, 2020; Covid impacted participants underwent their treatment round(s) following May, 2020

Environmental Questionnaire Child Participants	**Pre-Covid (n=38)**	**Covid Impacted (n=44)**	**Total (n=82)**
Do you socialize with friends outside of school?	28 (73.7%)	31 (70.5%)	59 (72.0%)
Do you do any activities outside of school (e.g., sports teams, clubs, etc.)?	31 (81.6%)	25 (56.8%)	56 (68.3%)
Do you have your own bedroom?	30 (78.9%)	39 (88.6%)	69 (84.1%)
Do you feel safe in your home?	33 (86.8%)	40 (90.9%)	73 (89.0%)
Do you have an adult you can trust?	34 (89.5%)	39 (88.6%)	73 (89.0%)
After disclosing your trauma:			
Did you feel believed?	30 (78.9%)	32 (72.3%)	62 (75.6%)
Did you feel supported?	33 (86.8%)	27 (61.4%)	60 (73.2%)
Did you feel like it was acted on properly?	30 (78.9%)	33 (75.0%)	63 (76.8%)
Environmental Questionnaire Adolescent Participants	**Pre-Covid (n=33)**	**Covid Impacted (n=42)**	**Total (n=76)**
Do you hang out with friends outside of school?	28 (84.8%)	27 (64.3%)	55 (73.3%)

Do you do any activities outside of school (e.g., sports teams, clubs, etc.)?	22 (66.7%)	23 (54.8%)	35 (46.7%)
Do you have your own bedroom?	31 (93.9%)	39 (92.9%)	70 (93.3%)
Do you feel safe in your home?	30 (91.0%)	40 (95.2%)	70 (93.3%)
Do you have an adult you can trust?	26 (78.8%)	37 (88.1%)	63 (84.0%)
After disclosing your trauma:			
Did you feel believed?	28 (84.8%)	23 (54.8%)	51 (60.0%)
Did you feel supported?	25 (75.8%)	28 (66.7%)	53 (70.7%)
Did you feel like it was acted on properly?	19 (57.6%)	16 (38.1%)	35 (46.7%)

5b.8.3 TABLE 3a. Results from self-report questionnaires answered by young child sexual abuse survivors (aged 8-12) engaged in a multimodal treatment program for their abuse.

CHILD PROGRAM	**Domain (range)**	**Median (B)**	**95% CI**	**Median (T1/T2)**	**95% CI**	**Δ%**	**p**	**p***
Round One Results (n=82)								
Pre-COVID (n=38)	PTSD (0-51)	25	[20, 31]	18.5	[15, 26]	-26.0%	0.036	0.083
	Depression (0-30)	20.5	[14, 23]	13	[11, 22]	-36.6%	0.05	**0.01**
	Anxiety (0-45)	21	[17, 28]	15.5	[13, 24]	-26.2%	0.001	**0.008**
	Quality of Life (0-44)	24	[22, 27]	26	[24, 29]	8.3%	0.093	0.13
	Self-Esteem (0-30)	15.5	[12, 19]	18	[15, 20]	16.1%	0.015	**0.05**
COVID-Impacted (n=44)	PTSD (0-51)	29.5	[25, 34]	23	[18, 28]	-22.0%	0.001	**0.01**
	Depression (0-30)	18.5	[14, 22]	14.5	[11, 18]	-21.6%	0.005	**0.031**
	Anxiety (0-45)	23	[17, 26]	17.5	[13, 22]	-23.9%	0.093	0.13
	Quality of Life (0-44)	25	[22, 28]	26	[23, 29]	4.0%	0.29	0.073
	Self-Esteem (0-30)	15.5	[14, 17]	17	[14, 19]	9.7%	0.17	0.21
Round Two Results (n=50)								
	PTSD (0-51)	27	[15, 33]	21.5	[11, 29]	-20.4%	0.015	**0.05**

Pre-COVID (n=24)	Depression (0-30)	20.5	[11, 23]	13.5	[11, 20]	-34.1%	0.11	0.14
	Anxiety (0-45)	24	[14, 29]	18.5	[10, 23]	-22.9%	0.091	0.13
	Quality of Life (0-44)	23	[21, 26]	26	[20, 29]	13.0%	0.32	0.36
	Self-Esteem (0-30)	16	[11, 22]	16.5	[12, 22]	3.1%	0.88	0.88
COVID-Impacted (n=26)	PTSD (0-51)	27	[22, 32]	23	[12, 30]	-14.8%	0.22	0.26
	Depression (0-30)	16.5	[13, 23]	12	[8, 19]	-27.3%	0.01	0.048
	Anxiety (0-45)	18	[16, 25]	13.5	[9, 22]	-25.0%	0.14	0.18
	Quality of Life (0-44)	27	[22, 29]	28.5	[26, 31]	5.6%	0.066	.12
	Self-Esteem (0-30)	17	[13, 21]	19	[13, 21]	11.8%	0.33	.36

Footnote: Median scores are reported from initial admission (B), end of treatment round one (T1), and end of treatment round two (T2). Participant answers were recorded at initial admission (baseline). Pre-Covid participants underwent their treatment round(s) prior to March, 2020; Covid impacted participants underwent their treatment round(s) following May, 2020

5b.8.4 TABLE 3b. Results from self-report questionnaires answered by adolescent child sexual abuse survivors (aged 13-17) engaged in a multimodal treatment program for their abuse.

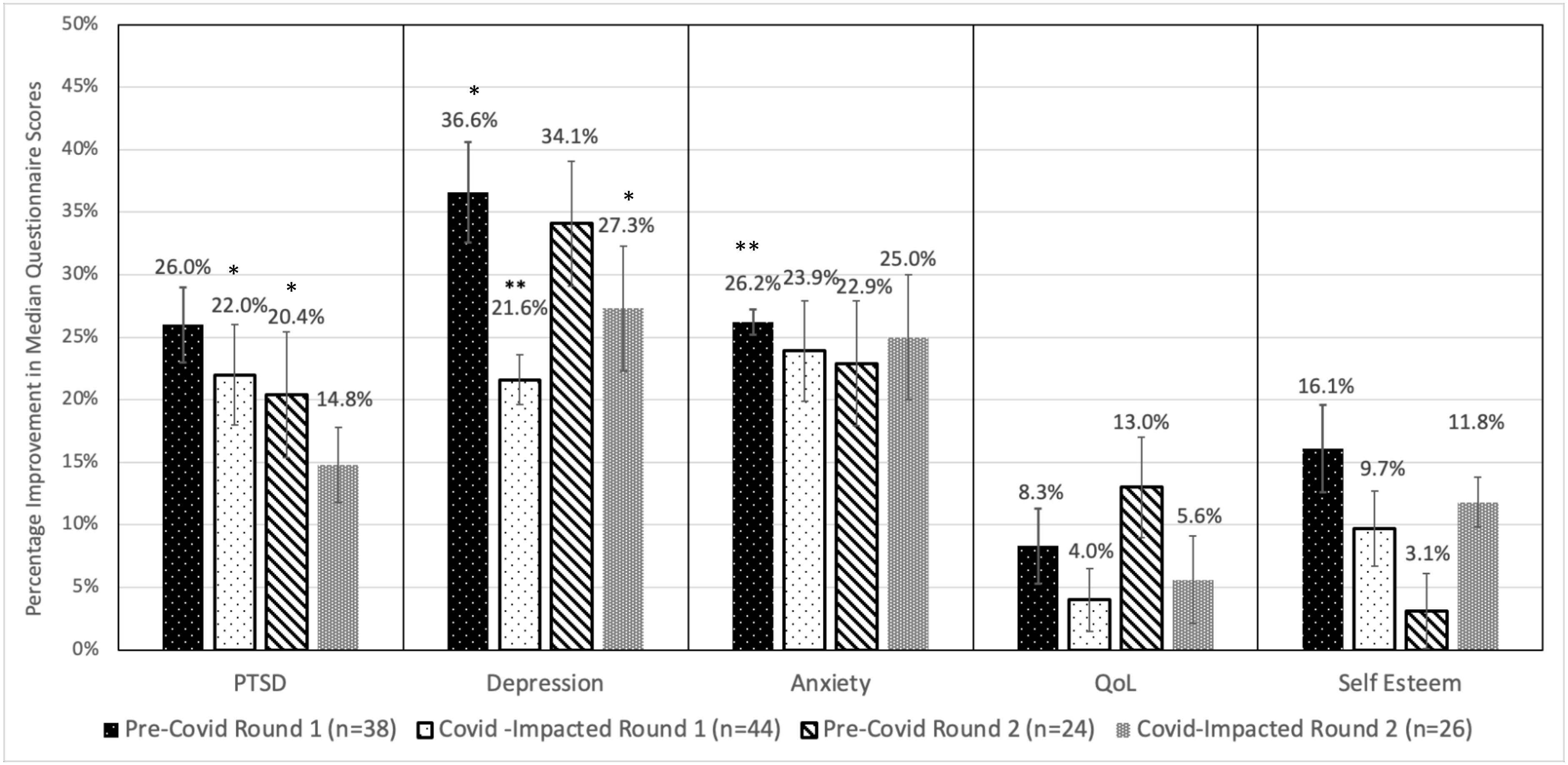
TEEN PROGRAM	**Domain (range)**	**Median (B)**	**95% CI**	**Median (T1/T2)**	**95% CI**	**Δ%**	**p**	**p***
Round One Results (n=75)								
Pre-COVID (n=33)	PTSD (0-51)	32	[23, 17]	22	[17, 29]	-31.3%	<0.001	**0.005**
	Depression (0-27)	14	[12, 15]	11	[8, 12]	-21.4%	0.007	**0.031**
	Anxiety (0-21)	16	[13, 18]	11	[7, 14]	-31.3%	<0.001	**0.007**
	Quality of Life (0-44)	19	[16, 22]	21	[17, 23]	10.5%	0.026	0.069
	Self-Esteem (0-30)	10	[7, 12]	12	[10, 15]	20.0%	0.012	**0.048**
COVID-Impacted (n=42)	PTSD (0-51)	30	[25, 34]	25.5	[17, 30]	-15.0%	0.02	**0.048**
	Depression (0-27)	12.5	[10, 14]	11	[8, 13]	-12.0%	0.11	0.14
	Anxiety (0-21)	14	[12, 16]	10	[9, 13]	-28.6%	0.007	**0.026**
	Quality of Life (0-44)	19.5	[16, 23]	20	[19, 23]	2.6%	0.08	0.13
	Self-Esteem (0-30)	12	[10, 15]	14	[11, 15]	16.7%	0.02	0.062
Round Two Results (n=47)								
	PTSD (0-51)	32	[24, 36]	23	[20, 30]	-28.1%	0.007	**0.031**

Pre-COVID (n=23)	Depression (0-27)	14	[12, 15]	10	[7, 12]	-28.6%	0.026	0.059
	Anxiety (0-21)	18	[15, 20]	11	[8, 15]	-38.9%	0.003	**0.024**
	Quality of Life (0-44)	19	[16, 23]	21	[19, 24]	10.5%	0.057	0.10
	Self-Esteem (0-30)	9	[6, 11]	10	[8, 13]	11.1%	0.11	0.14
COVID-Impacted (n=24)	PTSD (0-51)	28.5	[15, 34]	21	[13, 27]	-26.3%	0.041	0.091
	Depression (0-27)	12	[8, 14]	10	[5, 11]	-16.7%	0.093	0.13
	Anxiety (0-21)	14	[8, 18]	10	[8, 16]	-28.6%	0.32	0.36
	Quality of Life (0-44)	20.5	[16, 24]	22	[18, 24]	7.3%	0.40	0.42
	Self-Esteem (0-30)	14.5	[12, 17]	15	[9, 19]	3.4%	0.65	0.67

Footnote: Median scores are reported from initial admission (B), end of treatment round one (T1), and end of treatment round two (T2). Participant answers were recorded at initial admission (baseline). Pre-Covid participants underwent their treatment round(s) prior to March, 2020; Covid impacted participants underwent their treatment round(s) following May, 2020

5b.9 Figures

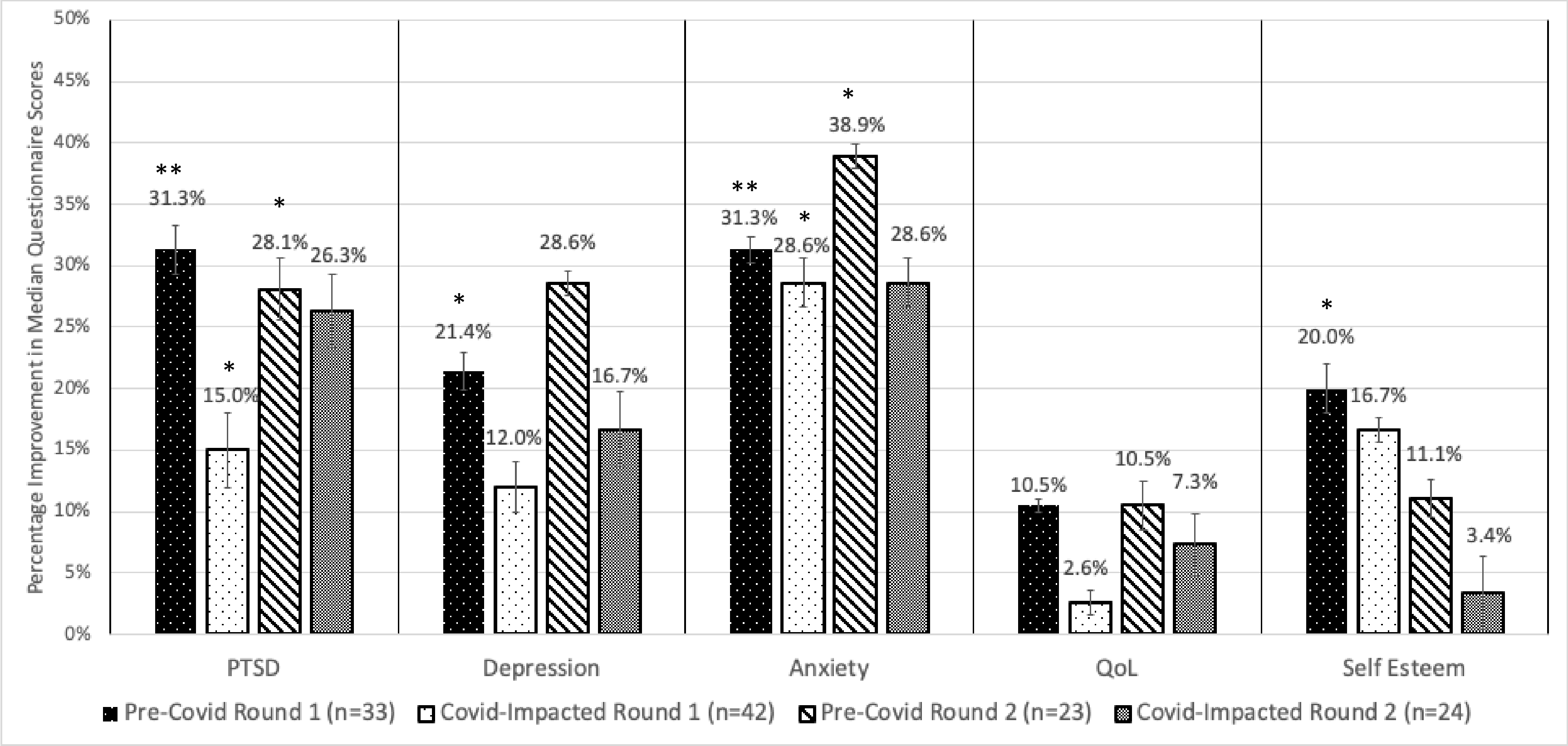
5b.9.1 FIGURE 1. Percent improvements in median self-report questionnaire scores for child survivors of child sexual abuse (aged 8-12) engaged in a multimodal treatment program.



Footnote: Pre-Covid participants underwent their treatment round(s) prior to March, 2020; Covid impacted participants underwent their treatment round(s) following May, 2020. Round 1 results represent the change in median score from baseline to the end of the first round of treatment; Round 2 results represent the change in median scores from baseline to the end of the second round of treatment.

* (p<0.05); ** (p<0.01) [p-values are adjusted based on Benjamini-Hochberg method for false discovery rate correction]; variability indicators represent standard error

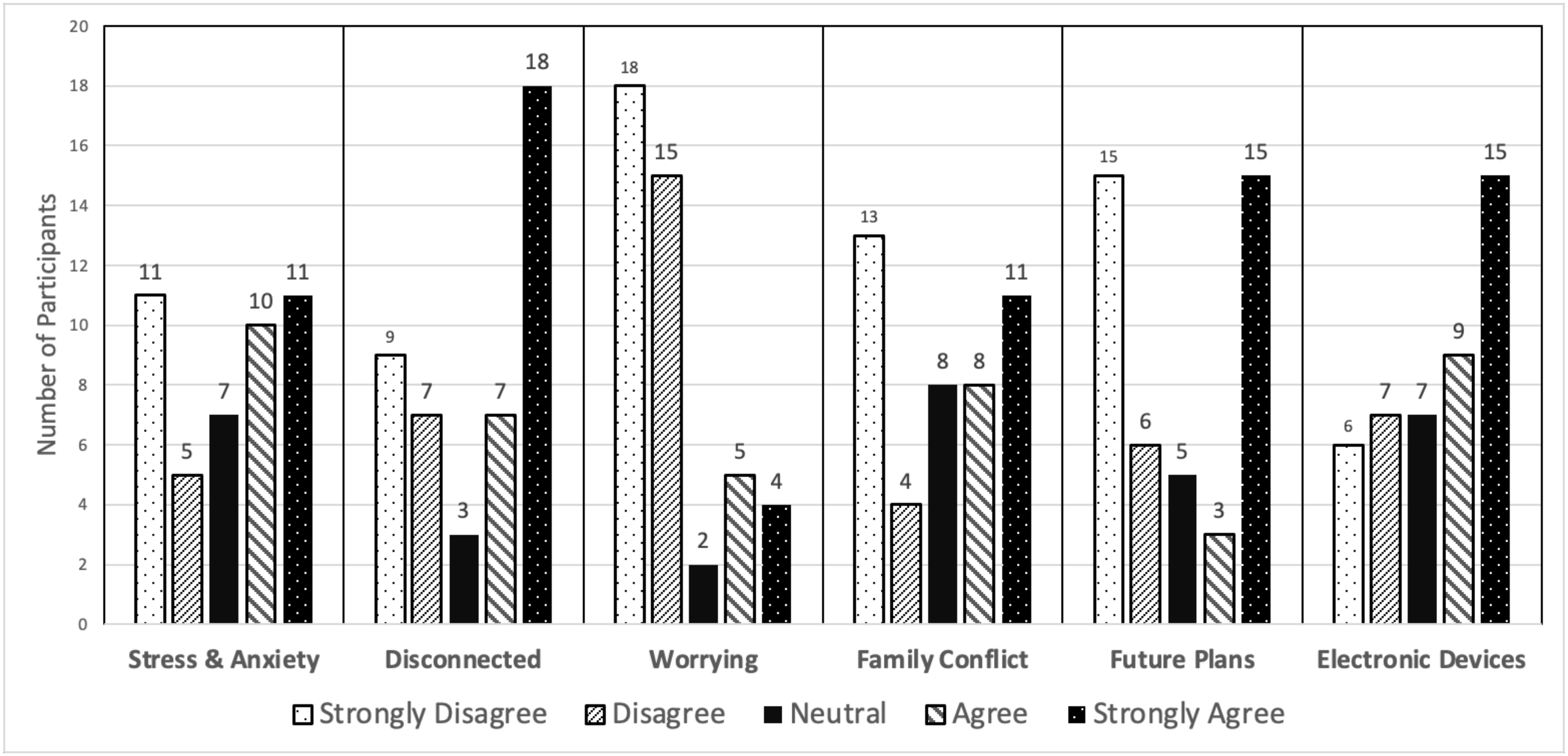
5b.9.2 FIGURE 2: Percent improvements in median self-report questionnaire scores for adolescent survivors of child sexual abuse (aged 13-16) engaged in a multimodal treatment program for their abuse.



Footnote: Pre-Covid participants underwent their treatment round(s) prior to March, 2020; Covid impacted participants underwent their treatment round(s) following May, 2020. Round 1 results represent the change in median score from baseline to the end of the first round of treatment; Round 2 results represent the change in median scores from baseline to the end of the second round of treatment.

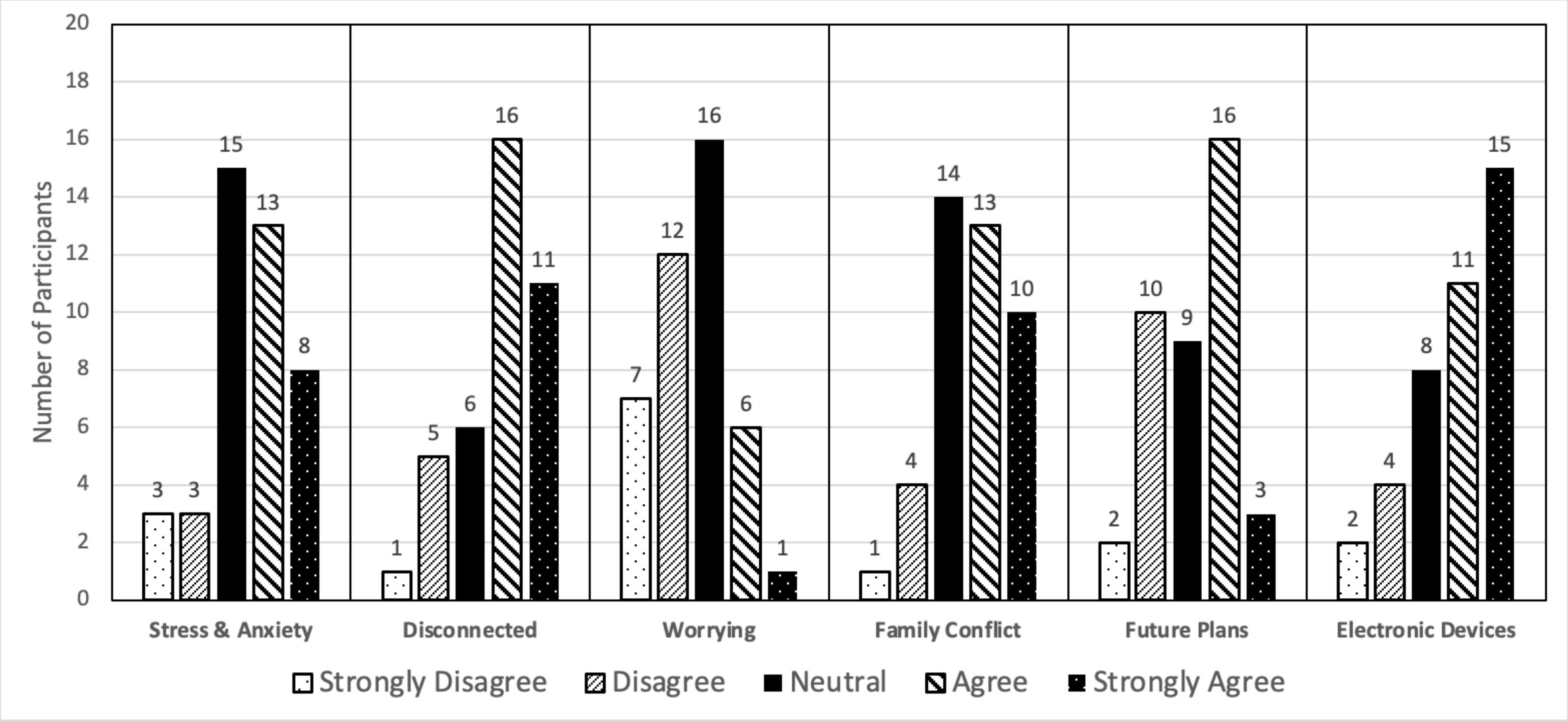
* ($p<0.05$); ** ($p<0.01$) [p-values are adjusted based on Benjamini-Hochberg method for false discovery rate correction]; variability indicators represent standard error

5b.9.3 FIGURE 3: Results from the COVID-19 Questionnaire for child survivors of child sexual abuse (aged 8-12) engaged in a multimodal treatment program for their abuse



Footnote: The results show the level of agreement or disagreement with each statement (see Appendix A for full questionnaire). Higher levels of agreement equate to a greater self-reported impact of the COVID-19 pandemic.

5b.9.4 FIGURE 4: Results from the COVID-19 Questionnaire for adolescent survivors of child sexual abuse (aged 13-16) engaged in a multimodal treatment program for their abuse



Footnote: The results show the level of agreement or disagreement with each statement (see Appendix A for full questionnaire). Higher levels of agreement equate to a greater self-reported impact of the COVID-19 pandemic.

5b.10 Appendix A: Assessment Details

5b.10.1 Outcome Measures

5b.10.1.1 PTSD

Post-Traumatic Stress Disorder (PTSD) levels were assessed using the Child PTSD Symptom Scale (CPSS), a validated self-report outcome measure for this population. The CPSS contains 17-questions relating to the frequency of each PTSD symptom listed in the *DSM-V*. Answer options are given on a Likert-scale ranging from 0 (*not at all*) to 3 (*5 or more times a week*). Total scores range from 0-51 and represent the following sub-categories: (0-10) *Below Threshold,* (11-15) *Subclinical/Mild*, (16-20) *Mild*, (21-25), *Moderate*, (26-30) *Moderately Severe,* (31-40) *Severe,* and (41-51) *Extremely Severe.* A score of 15 or higher is considered an appropriate clinical cut-off for diagnosing PTSD. CPSS scores were collected at every timepoint.

5b.10.1.2 Depression & Anxiety

Depression and anxiety were measured using the 25-question Revised Children's Anxiety and Depression Scale (RCADS-25), which is a shortened version of the more extensive 47-question RCADS. The RCADS-25 is a validated self-report measure for depression and anxiety in children. The full questionnaire is broken down into two subscales for total depression and anxiety. Each question is scored on a Likert scale ranging from 0 (*never*) to 3 (*always*). Overall scores range from 0-75, with higher scores indicating a greater degree or anxiety and depression. The anxiety subscale includes 15 questions, and scores can range from 0-45; the depression subscale includes 10 questions and can range from 0-30. The threshold for severity varies between age and gender, thus there are not discrete cut-off score for this scale. RCADS-25 questionnaires were collected at all timepoints.

5b.10.1.3 Quality of Life

Quality of life was measured using the KIDSCREEN-10, a validated self-report measure designed for children and adolescents. KIDSCREEN-10 consists of 10 questions relating to how often the individual has positive experiences that are indicators of quality of life. Each question is scored on a Likert scale ranging from 0 (*not at all/never*) to 4 (*extremely/always*). KIDSCREEN-10 also contains a bonus question that asks: “In general, how would you say your health is?” in which the answers range from 0 (*poor*) to 4 (*excellent*). Overall scores range from 0-44, with higher scores indicating better quality of life. KIDSCREEN-10 questionnaires were collected at all timepoints.

5b.10.1.4 Self-Esteem

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES), a validated self-report measure for children. The RSES consists of 10 questions that ask the individual how much they agree or disagree with a statement relating to how they view themselves. The questions are scored on a Likert scale that ranges from 0 (*strongly agree)* to 3 *(strongly disagree).* A total score is achieved through summation of results, and can range from 0-30, with higher scores indicating better self-esteem. A score between 15-25 is considered in the *normal* range, with scores below 15 suggesting low self-esteem. RSES scores were collected at all timepoints.

5b.10.2 COVID Questionnaire

In order to assess the impact of the COVID-19 Pandemic on those participants who began their treatment after its onset, a 6-question COVID Questionnaire was included in the baseline surveys for all participants. Each question was scored on a Likert scale ranging from 1 (*Strongly Disagree)* to 5 (*Strongly Agree*). The questions were worded so that stronger agreement (thus higher scores) indicated a greater impact of the pandemic.

5b.10.2.1 COVID Questionnaire Example

The following questions relate to the COVID-19 Pandemic. Please indicate to what extent you agree or disagree with each statement:

1. The COVID-19 pandemic has increased my overall stress and anxiety
2. Social distancing has made me feel disconnected from my friends and/or family
3. I spend a lot of time worrying about the COVID-19 pandemic
4. Self-isolation has increased the amount of conflict with my family
5. My fears about COVID-19 have interfered with my plans for the future
6. The COVID-19 pandemic has increased the amount of time I spend on electronic devices

Chapter 6: Summary of Findings and Future Directions

6.1 Background

Child and adolescent mental health services (CAMHS) need evidence-based research to establish best-practice interventions[1]. Considering three out of four mentally ill adults experience the onset of their symptoms prior to the age of 18[2], strategies aimed at improving CAMHS can proactively lessen the burden of adult mental illness and should be considered a top priority for the Canadian healthcare system[3,4]. At present, there is no gold-standard for treatment, and evaluation of therapeutic programs is rarely conducted[5,6]. Further, despite the large number of validated assessment tools available for this population, no consensus on the utilization of outcome measures in CAMHS currently exists[1]. Without proper assessment, determining whether or not a treatment is "successful" is difficult.

An important consideration when treating mental illness in youth populations is the malleability of younger brains and the way in which this makes them more susceptible to environmental influences[7-9]. It has been well established that early-life stress increases the risk of mental illness and substance abuse in the impacted individual[10]. Despite the strong link between Adverse Childhood Experiences (ACEs) and mental illness, limited research has attempted to determine what the best-practice treatment options are for youth with a history of early-life stress. It is possible that treatment programs focused on the specific experience(s) responsible for the onset of mental illness may be more beneficial than those aimed at a particular diagnosis or set of symptoms.

The aim of this dissertation was to provide recommendations on improving CAMHS. Specifically, this dissertation investigated the implementation of assessment tools in a youth treatment program, with a particular emphasis on the impact of early-life adversity on mental illness and treatment outcomes. The findings of these research studies are summarized below.

6.2 Summary of Findings

In chapter 2, a qualitative assessment of stakeholder perceptions at a child and adolescent psychiatric inpatient unit was conducted. Thematic analysis of focus group discussions helped identify important determinants of "success" in treatment. The findings were based on the perceptions of inpatient service providers as well as the parents of psychiatric inpatients. Thematic analysis revealed five primary components relevant to treatment success and stakeholder satisfaction: (1) the mental health and well-being of the child or adolescent; (2) the mental health and well-being of the parents; (3) the integrity of the child-parent dyad; (4) educational, social and occupational competency and success; (5) Interactions with services and institutions. Together, these five components represent factors that are significant when evaluating treatment success in CAMHS.

During these interviews, parents noted the negative impact of stigma, be it internal, coming in the form of negative self-perceptions, or external—unfair judgements from outside sources such as family, friends, and co-workers[11]. These judgements may impact the well-being of both the child and parent, effectively impacting the strength of the parent-child dyad by inducing stress on the individual components of this relationship[11,12]. Requiring mental health treatment can be particularly stigmatizing for a young person, especially in an inpatient setting which can feel "institutional" and separate from the outside world[10]. Stigmatization is a significant barrier to service access for youth and can negatively impact treatment outcomes[12,13]. Parents also emphasized the benefit of the milieu in inpatient treatment, citing the important friendships and positive relationships developed with peers and staff while in the program. Positive socialization is a predictor of psychiatric inpatient treatment outcomes and should be considered an important aspect of any intensive treatment program for youth[14]. Furthermore, the structure and safety provided by the program was noted as an significant factor in treatment outcomes. For children and youth with severe mental illness, the routine structure and predictability inherent to intensive therapy has been associated with positive outcomes, particular in youth with exposure to early-life trauma[15,16].

Service providers emphasized the importance of the therapeutic milieu in determining treatment outcomes. The therapeutic milieu is inherent to intensive treatment programs, and is defined as the distinct combination of service providers (e.g., mental health professionals, social workers, teachers, etc.), therapeutic options (e.g., CBT, DBT, group therapy, etc.), and demographics of the youth in treatment (e.g., age, gender, diagnosis, developmental history, etc.)[17]. Intensive treatment programs generally implement an interdisciplinary approach with multiple therapeutic options[18], and there is preliminary evidence that multimodal treatment may be superior to monotherapies[19]. The characteristics of youth concurrently undergoing treatment is an important determinant of treatment outcomes[17]. Service providers noted that without a waitlist "gatekeeper" who could determine the composition of certain cohorts, it was difficult to create the optimal blend of children or adolescents in the unit at any given time. Children who are surrounded by individuals with similar afflictions can help reduce the potential impact of stigma and assist in building the peer relationships important for treatment success[20]. For youth with a history of early-life trauma, it may be particularly beneficial to be surrounded by peers with relatable experiences[21].

The findings described in chapter 2 provided a framework for the subsequent research studies. Chapters 3-5 investigated treatment outcomes and relevant stakeholder information from a novel episodic and multimodal treatment program specifically designed for child sexual abuse (CSA) survivors aged 8-17—the Little Warriors Be Brave Ranch (BBR). The program consisted of four intensive rounds of treatment occurring over the course of one year. Each treatment round was 12-days in duration and required the participants to live at the facility[*]. The multimodal structure of the BBR provided the benefit of an interdisciplinary approach, but does so in a remote camp-like setting designed to reduce the institutional atmosphere of an inpatient unit. The common ACE of sexual abuse influences the therapeutic milieu to provide participants with an environment that is accepting and understanding of their trauma. The program separated cohorts by age (children aged 8-12 or adolescents aged 13-17) and controlled for biological sex to further enhance the therapeutic milieu. The BBR requires caregiver engagement for treatment and emphasizes the importance of dyadic therapy in treatment outcomes.

Although research investigating the efficacy of multimodal treatment programs for mentally ill youth is scarce, there is preliminary evidence that intensive residential treatment centers are effective at improving outcomes in severely disturbed children[22]. Multimodal interventions have shown initial success in treating ADHD[23,24] and eating disorders[25], but these programs differ from

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[*] The first round of treatment for the child program is 26 days

the BBR in their design and the interventions offered (e.g., pharmacotherapy). Intensive multimodal treatment has the capacity to care for individuals holistically, which may suggest multimodal treatment is best suited for youth struggling with adverse experiences (e.g., childhood trauma) rather than specific symptoms[26,27]. By its very nature, multimodal treatment must have some flexibility built into the program design to accommodate the heterogeneity of individuals undergoing treatment[28]. Furthermore, clearly defining eligibility criteria and individualizing treatment programming are considered essential for success in youth residential treatment[29]. By limiting inclusion to CSA survivors, the BBR tailored treatment towards a specific experience or set of experiences, which may have increased treatment effects. Multimodal programs can attempt to integrate treatment of the cognitive, spiritual, perceptual, and sensory impacts of early-life trauma[30].

To develop a better representation of the population under consideration, chapter 3 investigated the history of ACEs for both the participants undergoing treatment and their biological caregivers. Early-life adversity may transmit intergenerationally, either by the impact of living with a parent suffering from a mental illness or substance abuse disorder, or through heritable epigenetic mechanisms linked to early-life stress[31-34]. In chapter 3, the association of parent and child ACE scores was assessed. We found a moderate correlation ($r[90]=0.44$, $p<0.001$) between child and parent ACE scores. In a proportion analysis comparing the distribution of ACE scores with the general Alberta population, we found the reported level of ACEs to be significantly greater in both participants and their biological parents. Significantly, over 60% of parents surveyed reported being sexually abused in their childhood. These findings support previous research suggesting an increased risk for ACEs in the subsequent generations of trauma survivors[10,33,34]. A history of sexual trauma, in particular, appears to increase the risk of CSA in a subsequent generation[35]. A principal component analysis (PCA) conducted revealed three primary categories of ACEs: i) neglect, ii) lack of family cohesion, and iii) domestic violence. This suggests that differentiating between histories of household dysfunction, childhood abuse, and childhood neglect may be beneficial when considering treatment strategies and risk factors for CSA survivors.

The therapeutic design of the BBR is modelled around the Neurosequential Model of Therapeutics (NMT), as outlined by Perry (2006)[36]. Some individuals with early-life trauma have a heightened stress response as a result of their trauma; this overactivation of the sympathetic nervous system can lead to hypervigilance[37]. In other cases, in an attempt to cognitively shelter from threats of the outside world, persistent stress can induce an immobilized state. Catatonia is a particularly common symptom in victims of severe abuse[38]. The NMT adopts a ”bottom-up” approach to treatment by first implementing therapies that treat anatomically lower brain regions (i.e., the brainstem and diencephalon) through repeated positive somatosensory stimulation. This can be accomplished through yoga and mindfulness, recreational and play therapy, massage therapy, and/or music and movement[9]. The idea is to first treat core areas of the brain responsible for somatic functioning and limbic regulation in order to build the cognitive capacity necessary for higher-level trauma-informed practices (e.g., trauma-focused cognitive behavioural therapy (tf-CBT)) .

In chapter 4, a novel online cognitive assessment tool—MyCognition Quotient (MyCQ)—was used to assess whether child participants aged 8-12 showed improvements in cognitive functioning over the course of treatment. The goal was to determine whether a CSA therapeutic program, based off of the NMT framework, improved cognitive performance in five domains: attention, episodic memory, executive function, working memory, and processing speed. From the 54 children included in this study, the results showed an overall improvement in cognitive performance, with the mean age-standardized cognitive assessment score improving from the 48th percentile to the 53rd (p=0.005). The most significant improvements were observed in executive function (13.8 percentile improvement, p<0.001) and attention (13.5 percentile improvement, p=0.009). The findings of this study provide preliminarily support for the effectiveness of the NMT model in improving cognitive performance in CSA survivors.

Following investigation of the effects of the BBR treatment program on cognitive performance, chapter 5a assessed outcomes of mental health and well-being in adolescent female CSA survivors after their initial round of treatment. Participants were asked to complete surveys consisting of a number of validated self-report questionnaires at initial admission and at discharge after 12-days of treatment. Surveys included questionnaires assessing PTSD, depression, anxiety, quality of life, self-esteem, and resilience. Of the 27 participants included in this study, the mean scores on each outcome measure improved over the course of treatment. Paired t-test analyses revealed statistically significant reductions in PTSD (-20.3%, p=0.002), depression (-23.8%, p=0.001), and anxiety (-20.6%, p=0.006); likewise, mean scores for quality of life (17.6%, p=0.02) and self-esteem (22.9%, p=0.01) revealed statistically significant improvements. Considering the results only represent the first treatment round in which minimal tf-CBT is administered, it is possible that the highly supportive, safe, and fun environment provided by the BBR was responsible for the reported improvements, which is critical considering many participants may come from unstable environments where triggers of their abuse are present. The transition from stable environments to unstable may reverse the positive effects of treatment[9], and the establishment of safety, comfortability, and trust is necessary for the success of the therapeutic alliance—itself an essential factor in treatment outcomes[39].

Finally, chapter 5b built on the findings of chapter 5a by conducting a comprehensive assessment of mental health outcomes in both child and adolescent programs, with a specific focus of the impact of the COVID-19 pandemic on treatment success. This study assessed the change in outcome measures relating to PTSD, depression, anxiety, quality of life, and self-esteem from initial admission to discharge at the end of the first two rounds of treatment (half the program). Secondarily, participant data was differentiated as either pre-COVID (completion of treatment rounds prior to January, 2020) and COVID-impacted (initiation of treatment after April, 2020[*]).

Overall, positive changes were reported for all measures at both timepoints in both programs. In the child program, pre-COVID depression measures showed the largest improvements, with a 36.6% (p=0.05) reduction in reported symptoms after round one and a 34.1% (p=0.11) reduction after round two. In the pre-COVID adolescent group, the largest improvements were reported for anxiety at the ends of both treatment rounds (R1: -31.3%, p=0.007; R2: -28.6%, p=0.007). At nearly every timepoint in every domain measured, the improvements reported by the COVID-impacted cohorts were lower than those of the pre-COVID era—this was true for both children and adolescents. The findings suggests that the onset of the COVID-19 pandemic had a detrimental impact on participants which may have resulted in treatment resistance. School closures, lockdowns, anxiety around illness and death, fear of losing loved ones, and a reduction in peer

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[*] As a result of the onset of the COVID-19 pandemic, the BBR was forced to close from January-April, 2020. Therefore, no participants were treated during this period.

interactions have all been suggested as ways in which the onset of the pandemic has negatively impacted youth[40-42]. Participants in this study were asked to complete questionnaires inquiring about the impact of the pandemic on their daily life. Both children and adolescents reported feeling disconnected from others, spending more time on electronic devices and social media, and experiencing increased levels of stress and anxiety. Despite spending more time socializing online, participants felt isolated and lonely, which highlights the way in which social media is a poor substitute for face-to-face interaction and has been shown to exacerbate mood disorders, particularly in adolescent females[43]. Adolescents also reported higher levels of family conflict, which may amplify the risk for mental health problems as parent-child conflict is a risk factor for mental illness[44].

In summary, the findings of this dissertation support the implementation of routine outcome assessment in a child and adolescent residential mental health treatment program using validated self-report measures. Stakeholder perceptions are essential to consider in this context, especially for parents. Considering the therapeutic milieu is a key component of any successful treatment program—this is true for both the composition of service providers, the combination of the treatments offered, and the demographics of the youth undergoing treatment[15,17]. The well-developed association of early-life stress and mental illness provides the rationale for collecting ACE-related data to inform service providers about trauma histories of both participants and their caregivers. Furthermore, creating treatment programs designed for a specific experience rather than a diagnosis may be useful for those with high levels of early-life adversity. Combining these considerations with rigorous and comprehensive outcome data will help improve services and maximize treatment effectiveness. By treating individuals earlier in life, CAMHS can prospectively lessen the significant burden of adult mental illness and substance abuse. Furthermore, treating traumatized youth has the capacity to break the chain of intergenerational trauma and prevent the onset of severe mental illness in youth.

6.3 Limitations

6.3.1 Sample Size and Program Assessment

Some of the findings of this dissertation are limited by the small sample sizes included in the research studies. Since participation in the discussions was limited to those who voluntarily agreed to partake and those who were available at the time, the focus groups conducted in chapter 2 only included ten parents total. Likewise, only six service providers volunteered to partake in the third focus group, and there was an unequal distribution of the provider types, with a bias towards administrative employees and social workers rather than mental health therapists, which may have skewed the results. The sample sizes in chapter 5a included fewer than 50 participants which limits the generalizability of the findings; however, chapter 5b included a sample size of over 150 participants and added to the findings from chapter 5a.

There were a number of reasons for the smaller sample sizes. First, limitations in facility size and resources available constricted the BBR to treating 10-15 participants at any given time. Second, a significant number of participants dropped out from the program or were discharged for inappropriate behavior. Dropout is a common challenge when engaging with intensive treatment programs for mentally ill youth[45]. Third, the longitudinal design of the BBR slows the rate at which participant data can be fully collected. For this reason, chapter 5a only assessed participants who completed the first treatment round, and chapter 5b included only the first two rounds (half the program). Chapter 4 was the only study that investigated the impact of the entire one-year program, but this was limited to children aged 8-12 because the adolescent program had not been implemented yet.

Second, none of the studies conducted were randomized controlled trials (RCTs), which limits the ability to isolate treatment effects from potential confounds such as the positive and stable environment at the BBR. With the exception of chapter 4, the assessment studies in this dissertation did not include a comparison group. Conducting a true RCT with a vulnerable population is difficult as it is unethical to purposely withhold treatment from vulnerable populations, but comparing outcomes from waitlist controls or CSA participants undergoing other forms of treatment would have improved the generalizability of the results. The cognitive assessment tool used in chapter 4 generated a percentile score based off age-standardized performance; this score was derived from a large and unrelated population. Unfortunately, relevant demographic information such as prevalence of mental illness or history of early-life adversity was not available for this comparison group. To improve validity, the studies conducted in Chapters 5a and 5b followed the National Institutes of Health (NIH) guidelines for pre-post studies with no control group[46]. This includes clearly identifying the study objective, eligibility criteria, intervention characteristics, and outcomes measured; conducting appropriate statistical analysis; and separation from participants and researchers analyzing the data. Abiding by these guidelines strengthened both research and program design.

6.3.2 Data Collection and Analysis

The findings of chapters 3-5 relied solely on convenience sample data from self-report outcome measures. Although the measures implemented were valid and reliable, the subjectivity inherent to self-report minimizes the strength of the results[47]. To improve the validity of the findings, questionnaire scores were shared with on-site therapists as an adjunct to care plan formation; as such, therapists were able to communicate with researchers if any of the survey data reported was incongruent with observations of the therapists. Collecting data from other stakeholders, including caregivers, community members, and service providers is another useful way to control for the subjectivity of self-report[48]. Unfortunately, this data was difficult to collect due to the sensitive nature of engaging with stakeholders in this setting, as well as the lack of motivation some caregivers expressed in engaging with the research.

Another limitation of this dissertation is the variation in statistical methods used. In chapters 5a and 5b, the outcome measures used consisted of Likert scale scoring systems. For this type of data, a non-parametric analysis of statistical significance is considered more appropriate, since a normal distribution cannot be assumed. However, non-parametric analyses tend to have less power than parametric testing, which risks reducing the statistical strength of the conclusions[49]. In this dissertation, I have used both parametric and non-parametric data based on the advice of a voluntary scientific and research committee formed to guide the research at the BBR. In general, a traditional thesis carries the expectation that the method should be entirely consistent; however, it may be argued that, in a paper-based thesis—where results are presented and published on a project-by-project basis—what is important is that there is consistency in the standard statistical measures used, the data are orderly, and the effects are statistically significant. I contend that using a variety of methods is a strength of the this dissertation because both analyses resulted in essentially the same effects.

Although this dissertation engaged both qualitative and quantitative methods, none of the studies involved a mixed-methods approach, which combines both qualitative and quantitative data into one assessment. Supplementing quantitative findings with qualitative data is a useful way to improve the reliability and validity of results[50]. The initial aim of the research conducted at the GRH inpatient unit was to conduct a quantitative analysis of inpatient outcome measures. However, upon investigation into data collection, it was revealed that routine outcome assessment was being collected on very few patients, creating a significant barrier to carrying out a successful quantitative analysis. As such, the study pivoted to a qualitative assessment of stakeholder perceptions, which revealed the value of engaging in a qualitative analysis when quantitative data is unavailable. No qualitative analysis was done with youth inpatients at the GRH or with any of the stakeholders at the BBR. This was due to the sensitive nature of stakeholder engagement in these settings. Although I would have liked to collect qualitative findings, because of the unique connection between clinical staff and clients in this population, a consensus of opinion among the research leads was that it may be inappropriate for such a qualitative study to be conducted by an individual without clinical training and clinical practice credentials such as myself.

6.3.3 Response shift

Response shift relates to how patients interpret their underlying mental illness and the ways in which they may perceive treatment success[51]. Response shifts result from reconceptualization of one's condition by redefining conditions (e.g., anxiety or depression), reprioritization of factors that indicate improvement, and recalibration of the interpretation of self-report measures/scales[52]. In general, response shifts can lead to noise in the data that makes it difficult to determine whether improvement is real or perceived[53]. As there was no pre-post analysis in Chapters 2 and 3 of this dissertation, response shift was not a relevant limitation to these studies. However, for Chapters 4, 5a, and 5b, the hospitable environment of the BBR may have been a respite for many participants from their stressful home lives which may have caused response shifts that biased the data. This limitation potentially may be overcome by increasing the sample size and supplementing quantitative data with qualitative analysis.

6.3.4 Researcher bias

Implicit biases can often influence the interpretation and validity of research data and should be considered with any scientific investigation[54]. The author of this dissertation was employed by the BBR to assess potential benefits of the program, with the hope that evidence-based research would support the program's design. Acknowledging that there was an implicit bias to find positive results, we implemented strategies to mitigate this bias. A scientific and research committee—consisting of both BBR stakeholders and mental health and psychiatric professionals external to the BBR—oversaw all research studies conducted. Researchers were not present during the time of data collection to ensure participants were not biased by their presence. Considering both treatment settings investigated in this dissertation were intensive child and adolescent programs, there were understandable sensitivities around researcher access to participants. Collaboration between clinical staff and researchers is essential to facilitate research in these contexts, and the staff at the BBR were instrumental in maintaining data collection. As stated, we have been careful to note the limitations of the data collected and that the conclusions are based on a relatively small data set. From an academic perspective, statistically significant preliminary results are only valuable if they are replicated and extended in future work, so I have avoided making definitive claims in relation to conclusions.

6.4 Recommendations for Future Research

The following recommendations for future research consider the aforementioned limitations and suggest ways in which the findings of this dissertation can be improved upon.

6.4.1 Inclusion of relevant stakeholders in outcome assessment

Determining treatment outcomes in mental health services is a challenging process because mental illness manifests heterogeneously. The complex interaction of genetic predispositions and environmental experiences produces a spectrum of psychiatric disorders, many of which overlap in their clinical presentation[55]. Self-report measures are often utilized in mental health treatment settings in an effort to assess the patient's perception of treatment success; however, assessing patient perception is only one of many relevant determinants of treatment effects. Outcomes obtained from relevant stakeholders should be incorporated into any mental health service[48]; this is particularly true for youth, whose outcomes are highly associated with the health of the parent-child relationship[56]. Parental stress and mental illness have been well-established as risk factors for youth mental health disorders and substance use issues and should be considered in outcome assessments[57]. Furthermore, consultation with other relevant stakeholders such as academic experts in child and adolescent psychology and education, clinicians and practitioners, teachers, community members, family members, and peers should be considered as standard practice[58,59].

The qualitative analysis conducted in chapter 2 revealed a multitude of important factors relevant to stakeholders, but was limited to service providers and caregivers of adolescent psychiatric inpatients. Future research should expand on these findings by increasing the number of participants interviewed and attempt to engage with a variety of stakeholders. Assessment should be expanded to different treatment services such as outpatient programs or transition services. Using these findings, researchers can develop holistic outcome measures that appropriately capture treatment success. The incorporation of multiple sources of data will help maximize treatment efficacy and guide CAMHS in providing best-practice and evidence-based treatment[60].

6.4.2 The significance of ACEs and intergenerational trauma

It has been well established that early-life adversity is associated with the early onset of mental illness and substance abuse[61,62]; further, children whose parents have a history of ACEs are more likely to inherit the neurological impacts of early-life stress[31,63]. The findings of chapter 3 suggest that obtaining information relating to trauma-histories may be a helpful in assisting therapists in understanding the antecedents relevant to individual mental illness. This could assist service providers in providing personalized interventions that are finely tailored to individual needs in order to maximize treatment effects[64]. Future research should investigate how the incorporation of this information into empirically supported therapies can improve treatment outcomes.

Although it is true that not all ACEs result in trauma, the two are highly linked. Trauma is strongly predictive of treatment outcomes in a child and adolescent context; this is particularly true for individuals who have suffered more severe traumas (e.g., sexual or physical abuse), and those who have survived multiple traumatic events[26]. In a Canadian context, the significantly higher rates of mental illness, substance abuse, and suicide in Indigenous populations is an important consideration[65]. An association between exposure to the Indian Residential School system and risk for mental illness and suicide has been established[66,67]. Investigating the intergenerational impact of trauma that Indigenous youth in these communities have faced, and continue to face, should be a priority for researchers. Future research should focus on engagement with Indigenous communities across Canada, with an emphasis on improving access to services, and developing a culturally sensitive approach to mental health care in these communities[68].

6.4.3 Assessment of multimodal treatment for CSA survivors

6.4.3.1 Full Program Assessment

The longitudinal design of the BBR—coupled with the unanticipated forced shutdown upon the onset of the COVID-19 pandemic—limited the number of participants who had completed the entire program over the course of investigation. The preliminary results of this dissertation support the positive impact of treatment on this population; however, whether these improvements maintain over time is unclear. Future research should assess the changes in outcomes over the course of the full treatment program as compared to partial program completion. These findings will provide a better understanding of the impact of a longitudinal and episodic treatment design. Obtaining outcomes at intake and discharge of each treatment round may provide a better understanding of the acute effects of treatment. Furthermore, observing how outcomes change in between treatment rounds may provide an indication of the challenges each child or adolescent faces when leaving the treatment facility.

Evaluation of the BBR is constrained by its longitudinal program design and its limited capacity. Intensive residential treatment programs require significant investment of time and resources to be implemented effectively[28]. As a result, the number of individuals who can be treated at any given time is limited by the resources available to the treatment facility. At the BBR, only 15-20 individuals will complete the full program within any 12-month window, which limits the sample size and requires any comparison group to remain engaged with treatment longitudinally. A stepped-wedge randomized cluster design (SWD) is a method to overcome this constraint[69]. In a SWD, participant data collection begins prior to the initiation of an intervention so that the change in outcomes with and without the intervention can be monitored for each individual. Participants act as their own controls (i.e., internal controls) which may overcome some of the heterogeneity in symptom manifestation common to CSA survivors[70]. Each new cohort initiates treatment after the preceding cohort(s) so data can accumulate over time. Ideally, SWDs include regular outcome collection from multiple treatment sites[69]. A noted limitation of this dissertation is that data collection was limited to a single treatment center. Future research should utilize SWDs in multiple settings to compare outcomes with other youth treatment programs. In doing so, treatment designs can be evaluated for efficacy internally, while being concurrently appraised against alternative programs. This would provide useful information on best-practice treatment approaches and assist in determining who is most likely to benefit from specific treatment options. Unfortunately, studies such as these require significant buy-in and resource investment, making them difficult to implement[69]. In the BBR context, the recent development an online psychoeducational program designed for adolescent CSA survivors provides an opportunity to overcome this constraint. Future studies could include participants receiving the online program as a comparative cluster in a SWD. Based on availability, waitlist participants could be randomized into treatment only, psychoeducation only, or psychoeducation plus treatment, to determine the impacts of each intervention on outcomes. Using a SWD in this context can help to produce relevant outcome data without having to randomize vulnerable individuals into less intensive interventions that may not provide any therapeutic benefit[71].

Another focus of future research should be on the development and evaluation of transitional processes aimed at supporting individuals after treatment. Integration of follow-up programs and aftercare is considered a key component of youth residential treatment centers[28]. Implementing strategies aimed at assisting youth following discharge from treatment is essential to maintain treatment effects and prevent readmission[72]. Incorporating the development of life skills, psychoeducation, educational support, community engagement, and family functioning are useful strategies to prepare the child or adolescent for life post-discharge[73]. At present, the BBR has developed an online psychoeducational program designed for caregivers to assist them in understanding the complexity of their child's mental health problems and help them become more effective caregivers. In doing so, caregivers can be trained in skills that assist in the maintenance of positive improvements gained from treatment. Encouraging the implementation of similar programs is a useful way to improve outcomes long-term.

6.4.3.2 Comparison of outcomes to other populations

The lack of comparison groups in chapters 5a and 5b is a limitation to this dissertation. Future investigation of treatment success should compare mental health outcomes to other children and adolescents. A number of relevant comparison groups could be used for investigation, including: (1) CSA survivors not undergoing multimodal treatment, including those on the waiting list for treatment; (2) Youth undergoing multimodal treatment for non-CSA related mental illness (e.g., psychiatric inpatients with no history of CSA) ; (3) Youth undergoing multimodal treatment with a history of other forms of ACE (e.g., physical abuse, neglect, verbal abuse, etc.); (4) Youth CSA survivors undergoing monotherapy for their abuse. Each of these groups can be enrolled in a SWD study which facilitates comparisons both within individuals and between groups. Doing this successfully may demonstrate which treatment options are most beneficial for specific individuals, effectively maximizing treatment efficiency. However, this kind of approach requires significant funding, which we did not have access to.

6.4.3.3 Comparing outcomes for CSA survivors with or without PTSD

Trauma- and stress-related disorders are described in the DSM-V-TR as those disorders in which the primary cause of dysfunction is exposure to a traumatic or stressful event[75]. Although early-life adversity will generally induce some form of acute trauma, a diagnosis of PTSD requires the disturbance to last for more than a month. A common misconception is that all CSA survivors suffer from PTSD but roughly 40-50% of CSA survivors meet the diagnostic criteria for PTSD[76,77]. Future research should investigate whether treatment outcomes differ for PTSD vs non-PTSD CSA survivors, particularly in treatment programs that are primarily trauma-focused. As PTSD and CSA are more common and more persistent in females[2,78], treatment specific to PTSD and CSA in females may benefit the largest number of individuals.

6.4.3.4 Comparing multimodal treatment to other evidence-based treatment programs

The primary treatment program under consideration in this thesis was a complex, episodic, and multimodal treatment program. This program is novel in its design, which makes it difficult to find similar programs to directly compare it against. Preliminary evidence suggests that combination of evidence-based treatments may have the highest potential for improving outcomes[78]. At present, there is no gold-standard for combination therapy in CAMHS, including the interventions that should be included and the way in which these interventions should be combined. In a trauma context, any future multimodal treatment program should follow the BBR design in combining the common elements of well-established treatments for traumatized youth. These include: (1) Psychoeducation about trauma-prevalence, impact and intervention; (2) Training in emotion regulation strategies (e.g., cognitive coping or emotional relaxation); (3) Some form of exposure therapy; (4) Cognitive processing therapy; and (5) Development of problem solving and life skills[79]. Furthermore, intensive treatment programs for youth should consider the critical factors of success for residential treatment outlined by Kinark Child and Family Services in Ontario[28]. Comparing multimodal treatment against monotherapy and other forms of combination therapy may be essential to determine the potential benefit of these programs for CAMHS.

6.4.3.5 The impact of the COVID-19 Pandemic on youth mental health

The COVID-19 pandemic began in the midst of the research conducted in this dissertation. Government emergency measures led to severe restrictions on social settings, including closures of schools, and restrictive policies resulted in severe disruptions in the daily life of most individuals. The long-term impact of the pandemic is still unclear, but preliminary research suggests that social distancing, lockdowns, school closures, and the collective trauma of a public health crisis, has led to higher levels of individual stress and poorer mental health outcomes in youth[41,80]. Early research indicates that this may be particularly true for adolescents[81]. The onset of the COVID-19 pandemic provided me with a unique opportunity to assess the impact of a global pandemic on already vulnerable population. By comparing outcomes from children and adolescents undergoing treatment before and after the pandemic's onset, preliminary results revealed a potential resistance to treatment in pandemic-impacted participants. Wherever possible, future research should compare outcomes before and after the onset of the pandemic to further determine the impact of a collective trauma on child and adolescent mental health. Considering adolescents appear to be more prone to the negative effects of the pandemic, research investigating mitigation strategies, such as programs that enhance social interaction in a safe and healthy manner, should be conducted[42,80].

6.5 Conclusion

The aim of this dissertation was to provide recommendations that may improve mental health treatment and services for youth. The burden of mental illness on the healthcare system can be significantly reduced by proactively treating individuals early in the course of their condition. Increased awareness and education regarding mental health disorders in children and adolescents has helped shift the focus towards action and prevention, but the lack of standardization in outcome assessment remains a significant barrier to determining best-practice approaches. Considering the strong association between early-life adversity and youth mental illness, including trauma histories in screening and assessment is necessary. The intergenerational transmission of ACEs and their subsequent impact must also be considered when treating this population. Engaging in psychoeducation and transitional support for youth and caregivers is likely to further enhance treatment outcomes.

As this thesis was conducted in two intensive treatment settings, the work naturally flowed into consideration of outcomes in an inpatient clinical setting on the one hand, and a community-based residential treatment program on the other. The success of any mental health intervention is predicated on stakeholder perceptions of treatment outcomes—this is particularly true in a youth context. Engaging relevant stakeholders in treatment outcomes is necessary to properly evaluate the performance of an intervention. Intensive programs, such as inpatient or residential services, require significant resource allocation and are generally reserved for individuals with severe mental illness. From a public health perspective, identifying and treating youth with mental illness appropriately and effectively should be the highest priority[82]. From a health economics perspective, maximizing the availability and efficiency of these services is of the utmost importance[83].

This dissertation provides examples of the implementation of routine outcome assessment as means of evaluating a novel youth residential treatment program for CSA survivors. Based on the work I've done, it is clear that there is insufficient access and funding towards CAMHS. For services to be successful going forward, the most appropriate treatment for mentally ill youth in various contexts—be it inpatient, outpatient, or community-based—need to be identified, implemented, and made accessible. There is a huge need to evaluate whether intensive treatment settings are effective and, if so, who they are most effective for. By using routine outcome assessment, the most resource and time intensive treatment options can be assessed, improved upon, and maximized for efficiency. Without the adoption of universal outcome measures, it is not possible to get a clear view of how the investments in child and adolescent mental health should be made. Optimally, funding should be allocated to research that utilizes a mixed methods approach of analysis in order to successfully appraise service access, acceptability, appropriateness, effectiveness, efficiency, and safety[84,85]. The BBR design, with its built-in program evaluation and routine outcome assessment, provides an excellent framework for how youth residential treatment programs should be constructed.

Finally, the impact of the COVID-19 pandemic was an unanticipated interruption to the course of this research. The resultant policy changes, such as school closures and lockdowns, caused major disruptions in the daily life of children and adolescents globally. The preliminary findings from this research highlighted the damaging impact mass trauma can induce on an already vulnerable population. Future research investigating the mental health effects of the COVID-19 pandemic is necessary. The significant impact of environmental stressors—such as early-life trauma or a global pandemic—on the onset of mental illness cannot be overstated. Considering the constellation of mental health problems associated with ACEs, future research that investigates treatment programs aimed at specific experiences (e.g., CSA) rather than specific diagnoses or symptomatology is needed. The preliminary findings from the Be Brave Ranch suggest that this strategy may be effective, and this question warrants further investigation.

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