

Western  Graduate&PostdoctoralStudies

Western University
Scholarship@Western

Electronic Thesis and Dissertation Repository

6-23-2020 11:00 AM

The Sequelae of Psychological Symptoms Exhibited by Children Exposed to Trauma: A Developmental Perspective

Ying (Annie) Yang, *The University of Western Ontario*

Supervisor: Rodger, Susan, *The University of Western Ontario*

A thesis submitted in partial fulfillment of the requirements for the Master of Arts degree in Education

© Ying (Annie) Yang 2020

Follow this and additional works at: <https://ir.lib.uwo.ca/etd>

 Part of the [Social and Behavioral Sciences Commons](#)

Recommended Citation

Yang, Ying (Annie), "The Sequelae of Psychological Symptoms Exhibited by Children Exposed to Trauma: A Developmental Perspective" (2020). *Electronic Thesis and Dissertation Repository*. 7110.
<https://ir.lib.uwo.ca/etd/7110>

This Dissertation/Thesis is brought to you for free and open access by Scholarship@Western. It has been accepted for inclusion in Electronic Thesis and Dissertation Repository by an authorized administrator of Scholarship@Western. For more information, please contact wlsadmin@uwo.ca.

Abstract

Children who experience developmental trauma often exhibit a constellation of symptoms across several psycho-social-bio domains. This study explored the symptom clusters that school-age children and adolescents who have experienced maltreatment exhibit and whether these children/adolescents can be differentiated from those without trauma histories. Using data from the Child and Youth Mental Health instrument, exploratory factor analyses of clinical items were completed for children/adolescents who have experienced maltreatment. Six factors for children (i.e., dysregulation in cognitive processes, dysregulation in self-concept, externalizing behaviours, violent or high-risk behaviours, indicators of withdrawal and depression, and hyperarousal and anxiety behaviours) and 5 factors for adolescents (i.e., externalizing behaviours, affect dysregulation, substance use, withdrawal and indicators of depression, and hyperarousal and dysregulation in cognitive processes) emerged. Discriminant function analyses using factors scores accurately differentiated children and adolescents who have experienced maltreatment from those who have not, 61.5% and 63.7% of the time respectively.

Keywords. Trauma, Complex Trauma, Developmental Trauma, Maltreatment, Children, Adolescents, interRAI ChYMH, Children and Adolescent Mental Health,

Lay Summary

Background. Children who experience prolonged interpersonal trauma, or complex trauma, often exhibit a myriad of symptoms across several psycho-social-bio domains and self-regulation difficulties. These include dysregulation in affect, physiology, behaviour, attention, and cognition, disturbances in self-concept, attachment difficulties, and post-traumatic spectrum symptoms. A separate diagnosis of Developmental Trauma Disorder (DTD) was proposed, but not included in the latest version of the Diagnostic Statistical Manual, to account for the diverse clinical presentations found among children who have experienced complex trauma. However, there are few studies that have examined the validity of the DTD construct, due to the novelty of the proposed diagnosis. Further research on how trauma reactions present in children across different ages is necessary to provide the support for a developmental trauma diagnosis.

Objectives. This study explored the symptom clusters that school-age children (i.e., 4-11) and adolescents (i.e., 12-18) who have experienced maltreatment exhibits and whether these individuals can be differentiated from those without trauma histories based on clinical presentation.

Methods. Data from the interRAI Child and Youth Mental Health (ChYMH) instrument was obtained from mental health agencies across Ontario for an estimated 14 507 children and adolescents.

Results. Analyses were conducted to determine how items on the ChYMH grouped together to represent symptom clusters for children/adolescents who have experienced maltreatment. Six symptom groups for children (i.e., dysregulation in cognitive processes, dysregulation in self-concept, externalizing behaviours, violent or high-risk behaviours, indicators of withdrawal and depression, and hyperarousal and anxiety behaviours) and 5 symptom groups for adolescents

(i.e., externalizing behaviours, affect dysregulation, substance use, withdrawal and indicators of depression, and hyperarousal and dysregulation in cognitive processes) emerged. Further analyses revealed that scores on these symptom groupings were able to accurately differentiate between children/adolescents who have experienced maltreatment compared those who have not.

Implications. This study contributes to the growing body of literature that examines the varied effects complex trauma has on children/adolescents and lends preliminary support for DTD.

Understanding symptom presentations of children who experience trauma at different stages of development will inform the establishment of developmentally appropriate interventions for children and adolescents accessing mental health services across Canada.

Acknowledgements

First and foremost, I would like to express my upmost thanks and gratitude towards my thesis advisors Dr. Susan Rodger and Dr. Alan Leschied. Dr. Rodger, thank you for your unwavering support and guidance throughout the thesis process. Your commitment towards improving mental health care as an educator and researcher is truly inspiring. I am grateful to have had the opportunity to learn under your supervision. Dr. Leschied, this research would not have been possible without your guidance during the conceptualization of this research and your continuous belief in my ability to take on a challenging project. I would also like to thank Dr. Andrew Johnson for your expertise with statistics and your patient guidance while navigating the analyses. I would like to extend my appreciation to Dr. Shannon Stewart for the opportunity to work with the ChYMH dataset and your encouragement to complete this research.

Many thanks to my professors and peers who continuously challenge me to grow both professionally and personally. Lastly, I am forever grateful for the support of my family and childhood friends, Asim, Gillian, and Karen. Thank you for being a foundational support and a source of motivation for me throughout my academic journey.

Table of Contents

Abstract.....	ii
Lay Summary.....	iii
Acknowledgements.....	v
Table of Contents.....	vi
List of Tables.....	ix
List of Figures.....	x
Introduction.....	1
Prevalence Rates of Child Maltreatment.....	1
Healthy Child Development and Resiliency.....	2
Post-Traumatic Stress Disorder.....	4
PTSD Rates in Children.....	5
Beyond PTSD.....	6
Complex Trauma.....	8
Developmental Trauma.....	9
Developmental Trauma Framework.....	11
Affect Dysregulation.....	13
Behavioural Dysregulation.....	14
Interpersonal and Attachment Difficulties.....	15
Disturbances in Self-Concept.....	17
Cognitive Dysregulation.....	18
Physiological/Biological Dysregulation.....	19
Current Study.....	20
Objectives and Hypotheses.....	21

Methods	21
Procedure	21
Participants.....	22
ChYMH.....	22
Complex Trauma	23
Items Selected for Developmental Trauma Framework	24
Ethical Considerations	27
Data Analyses	27
Results.....	28
Descriptive Data and Participant Characteristics.....	28
Exploratory Factor Analyses.....	31
School-aged Children.....	31
Adolescents	36
DFA.....	42
School-aged Children.....	42
Adolescents	43
Discussion.....	43
Presentation of Developmental Trauma in School-Aged Children	45
Presentation of Developmental Trauma in Adolescents.....	48
Discriminating Children and Adolescents with Complex Trauma Histories.....	51
Limitations	53
Future Directions	54
Implications.....	55
Conclusion	56
Reference	57
Curriculum Vitae	71

List of Tables

Table 1: Participant Characteristics and Descriptive Data	30
Table 2: Factor Loadings of ChYMH Items with an Oblique Rotation for School-Aged Children	33
Table 3: Factor Loadings of ChYMH Items with an Oblique Rotation for Adolescents	38

List of Figures

Figure 1: Developmental trauma framework for the present study adapted from Van der Kolk et al. (2009) proposed DTD diagnostic criteria and Cook et al. (2005) domains of impairment in children exposed to complex trauma.	12
Figure 2: ChYMH Items Included in Analyses	26

Introduction

Child maltreatment is a public health concern that has global consequences for individuals, communities, and societies (Magruder et al., 2017). The adverse childhood experiences (ACE) study, led by Felitti and colleagues (1998), found strong associations between ACEs and negative life outcomes which include poor physical health, mental illness, lower educational and career attainment, and shorter life expectancies.

Numerous studies since the ACE publication have found long-term consequences associated with early traumatization (Briere et al., 2008; Koenen et al., 2007). The link between childhood trauma and disruption to social, cognitive, behavioural, and biological development has been substantiated through several meta-analyses (Alisic et al., 2011; Norman et al., 2012). In Canada, the minimum cost to society as a result of child maltreatment is estimated at 15.7 billion CAD (Bowlus et al., 2003). Although the pervasive effects of early trauma are well established, the developmental sequelae and presentation of trauma symptoms in children and adolescents are not well understood (Schmid et al., 2013). The purpose of the present study is to advance understanding regarding how the experience of trauma can reveal itself during different developmental periods.

Prevalence Rates of Child Maltreatment

Large-scale epidemiological studies have indicated that the experience of childhood trauma is common (Alisic et al., 2014; Trocmé, 2010; Van der Kolk, 2014). Findings from the ACE study indicated that two-thirds of an adult population presenting at a medical clinic had experienced at least one ACE (Felitti et al., 1998). Several studies over the last few decades have indicated that childhood traumas do not occur in isolation. Rather, victimized children often

experience multiple forms of co-occurring traumatic events (e.g., Van der Kolk, 2005; Spinazzola et al., 2005).

The most recent epidemiological data on child maltreatment in Canada comes from the 2012 Canadian Community Health Survey: Mental Health (Afifi et al., 2014). Adult self-reports gathered from 10 provinces across Canada found the prevalence of experiencing the three most common forms of child maltreatment in the general population was 32%. The forms of maltreatment were inclusive of physical abuse (26%), sexual abuse (8%), and exposure to intimate partner violence (8%). Of the individuals that have experienced maltreatment, approximately one-third had experienced more than one form of maltreatment.

Similarly, the Canadian Incidence Study (CIS) on the prevalence of child abuse and neglect examined child welfare cases across 10 provinces (Trocmé, 2010). Thirty-six percent of an estimated 235, 842 of open maltreatment investigations conducted in 2008 were substantiated. Eighteen percent of substantiated cases included more than one form of child maltreatment. Exposure to intimate partner violence (34%) and neglect (34%) were found to be the most common. Other categories of child maltreatment include physical abuse (20%), emotional abuse (9%), and sexual abuse (3%).

Healthy Child Development and Resiliency

Despite the various psychological and health risks associated with childhood maltreatment, many individuals with childhood trauma histories were found to have high rates of resiliency (Afifi et al., 2016; Galatzer-Levy et al., 2018). Early work focused on understanding the protective factors that promote healthy development to lend insight into the developmental trajectories of children who experience adversity. Specifically, early studies on resiliency focused on identifying individual traits that were associated with overcoming childhood

adversity (e.g., poverty) and the avoidance of psychopathology (e.g., Britton, 1969; Werner, 1996). However, determination of traits provided limited value for understanding the developmental processes involved in children that are able to circumvent adversity and the risks associated with early trauma (Wright et al., 2013). Subsequent research examined familial and social factors that promotes positive development (Masten, 2018). This resulted in the identification of numerous protective factors that stems from the individual and the social-ecological context in which the individual lives (e.g., Shannon et al., 2007; Simon et al., 2005; Masten & Obradović, 2006). Hence, recent research on resiliency examines variables at various levels of influence including individual traits, relational networks, community systems, and cultural context (Masten, 2018). Afifi and colleagues (2016) found a number of individual and relationship factors associated with positive mental health outcomes in a representative Canadian sample of adults with a history of child abuse. These factors include positive coping skills, having quality relationships with family and friends, and higher educational attainment.

These findings have led to the adoption of the developmental systems perspective, which understands factors related to resiliency through the developmental processes in which these factors interact (Lerner & Overton, 2008; Masten, 2018). From this perspective, children are part of multiple dynamic systems (i.e., family systems, school systems). Development of a child is dependent on the interactions between these systems. According to this developmental framework, Masten (2018) defined resiliency as “the capacity of a system to adapt successfully to significant challenges that threaten the function, viability, or development of the system” (p. 16). This framework has been used to study child and youth in the 4-H Study of positive youth development (Bowers et al., 2014; Lerner et al., 2005; Lerner & Overton, 2008). Children and parents from 42 states were followed longitudinally for eight years to investigate the processes

that promote positive youth development. Several factors (i.e., competency, connection, caring) were found to be associated with positive developmental trajectories (e.g., lower levels of risk behaviour, lower levels of depression; Jelicic et al., 2007). These results indicate that healthy development is a concatenation of protective psycho-social factors that interact within the systems (e.g., familial, school) in which development occurs. Therefore, when examining the effects of childhood adversities, trauma must be understood with consideration to the developmental context wherein the trauma occurred. Understanding of the developmental processes that are disrupted as a result of early adversity will lend insight into the breadth of outcomes and symptoms associated with the experience of early childhood trauma.

Post-Traumatic Stress Disorder

Post-traumatic stress disorder (PTSD) was first introduced as a formal diagnosis in the Diagnostic and Statistical Manual (3rd ed.; DSM-III; American Psychiatric Association, 1980) to conceptualize the psychological symptoms exhibited by Vietnam war veterans (Van der Kolk et al., 2005). Since then, the connection between traumatic experiences and subsequent psychological disturbances have been substantiated (Van der Kolk, 2005). The definition and criteria for PTSD has expanded to include psychological reactions and symptoms that result from a variety of traumatic experiences. PTSD remains the most common diagnosis that exists to define the symptom profiles of individuals that suffer from traumatic stress.

To meet the criteria for a PTSD diagnosis, an individual must have experienced a Criterion A trauma, as defined in the current Diagnostic and Statistical Manual (5th ed.; DSM-V; American Psychiatric Association [APA], 2013). This includes any event that involves exposure to actual or threatened death, serious injury or sexual violence. The exposure could be through direct or indirect means (e.g., exposure to aversive details of the event). Additionally, four

clusters of symptoms are outlined within the diagnostic criteria: intrusion, avoidance of the trauma related stimuli, negative cognitions and mood, and hyperarousal or hyperreactivity. These diagnostic criteria hold true for both adults and children above the age of six. However, studies over the past few decades have indicated that there are notable differences between the ways in which children and adults respond to trauma and the symptomology they present (Scheeringa et al., 2011).

PTSD Rates in Children

Although PTSD is a widely recognized diagnosis for adults who have experienced trauma, less research exists to substantiate this diagnosis for children. Over the last few decades, more thorough research on stress reactions in children has accumulated to suggest that children can develop symptoms that are similar to PTSD in adults; however, several differences exist regarding how children and adults respond to adverse life events (Dyregrov & Yule, 2006). A systematic review on prevalence rates of PTSD among adults indicated that 37% of adults who experienced intentional trauma, where there was deliberate infliction of harm, developed PTSD (Santiago et al., 2013). In contrast, a meta-analysis by Alisic and colleagues (2014) found a lower prevalence rate of 25% among children and adolescents who had experienced interpersonal trauma. Rates of PTSD among children and adolescents show large variabilities (0-100%) among different studies and is influenced by various factors including the type of trauma experienced, degree of exposure, and gender of the child (Alisic et al., 2014; Yule, 2001). PTSD rates among older adolescents exposed to trauma are typically higher (McLaughlin et al., 2013; Scheeringa et al., 2011), while younger children rarely meet full diagnostic criteria for PTSD with some studies suggesting rates lower than 1% (e.g., Copeland et al., 2007). This indicates that children may have different indicators of trauma reactions compared to adults and that there

may be a wider range of symptoms associated with stress reactions in children. In addition, symptoms expressed in response to trauma in children are influenced by age and developmental processes and manifestations of these symptoms may differ by age (Scheering et al., 2011).

Beyond PTSD

Questions remain as to whether the criteria for a PTSD diagnosis is sufficient to describe trauma reactions in children (D'Andrea et al., 2012). Nonetheless, PTSD remains one of the only diagnoses with criteria that acknowledges trauma as an antecedent in the DSM-V (APA, 2013). Researchers and clinicians have noted that children exposed to chronic interpersonal trauma often experience a myriad of symptoms beyond the criteria outlined in a PTSD diagnosis (Van der Kolk et al., 2009). Studies have shown that exposure to prolonged trauma in childhood can result in fundamentally different patterns of symptomology compared to a single traumatic event (e.g., motor vehicle accidents; Van der Kolk et al., 2005). Chronic childhood trauma often involves disruptions to a child's caregiver systems, such as in the case of child maltreatment. As a result, children who have experienced trauma often present with attachment difficulties, impairments in the regulation of affect and behaviour, and disturbances in self-perception (Cloitre et al., 2009). These impairments have been shown to persist into adulthood, resulting in mental and physical health issues across the lifespan (Felitti et al., 1998). Although the symptoms outlined in the diagnostic criteria for PTSD can be a consequence of trauma exposure, the current PTSD diagnosis alone does not encompass or account for the complexity of symptoms and clinical presentations seen in children who have experienced prolonged trauma (Ford & Courtois, 2009; Van der Kolk et al., 2009).

Moreover, the majority of individuals who have a history of childhood trauma were not found to develop PTSD. Rather, high rates of other forms of psychopathology and medical health

problems were found within this population (Jaffee, 2017; van der Kolk et al., 2009). A meta-analysis conducted by Alisic and colleagues (2014) found that among children and adolescents who experienced a DSM-V defined criterion A (i.e., direct or indirect exposure or threatened exposure to death, serious injury, or sexual violence; APA, 2013), or DSM-IV criterion A1 trauma (i.e., exposure to or threat of death, injury or threat to physical integrity of self-and/or others; APA, 2000), only 16% developed PTSD.

Children who have experienced trauma often develop some clinically significant symptoms of PTSD, but do not meet the full diagnostic criteria (Copeland et al., 2007). Instead, researchers have found that these children developed a constellation of symptoms that constituted sub-clinical levels of PTSD and several other diagnoses such as mood disorders, anxiety disorders, and behavioural diagnoses (e.g., ODD, ADHD). Children who developed PTSD were commonly found to experience several other psychological disorders indicating that the presence of comorbidities in traumatized children are high (Famularo et al., 1996; Copeland et al., 2007). Similarly, Afifi and colleagues (2014) examined the association between adult mental illness and retrospective reports of physical abuse, sexual abuse and witnessing intimate partner violence in childhood, within a Canadian sample. All three types of maltreatment were associated with increased odds of adult mental illnesses of all types.

Hence, childhood trauma has been found to be associated with all forms of psychological disorders and wide-ranging symptoms not reflected in the PTSD diagnostic criteria (Ballard et al., 2015). This may result in some children receiving multiple diagnoses that may not adequately address the trauma, while other children may not meet diagnostic criteria for any particular disorder but still exhibit pervasive symptoms (D'Andrea et al., 2012).

Lastly, PTSD as a diagnostic entity is not developmentally sensitive (Van der Kolk, 2005). Originally developed to meet the symptoms characteristic of adults who have experienced trauma, the utility of the PTSD diagnosis in children is limited and research in this area is scant (D'Andrea et al., 2012). Trauma affects the neuro-, bio-, physio-logical development of children's brains, leading to a sequela of biopsychosocial impairments that persist throughout development (De Bellis, 2001). Studies have shown that the age that the trauma was experienced contributes to the complexity of symptoms exhibited in children and adults, with trauma at an early age associated with the most negative long-term consequences (Cloitre et al., 2009; Copeland et al., 2007). Therefore, there is a clear developmental component associated with the ways in which trauma affects the individual and symptoms exhibited by children may differ from those of adults. The present criteria for PTSD do not account of developmental factors. Hence, many researchers and clinicians have advocated for a developmentally modified diagnosis for children who have experienced trauma (D'Andrea et al., 2012; Van der Kolk et al., 2005).

Complex Trauma

Researchers adopted the term complex trauma to describe symptoms exhibited by individuals who had experienced repeated and chronic traumatization (Herman, 1992). Specifically, complex trauma is defined by the experience of multiple, chronic, prolonged, and developmentally adverse events in childhood, and pertains to children who have experienced maltreatment (Spinazzola et al., 2005, Van der Kolk, 2005). Complex trauma is often used interchangeably as both a severe form of trauma exposure and the reactions of individuals who have been severely traumatized (Wamser-Nanney & Vandenberg, 2013). Studies have shown that symptom severity and complexity increased with repeated exposure to traumatic events (e.g., Green et al., 2000), experiencing traumatic events that are interpersonal in nature (e.g.,

Alisic et al., 2014; Kisiel et al., 2014), and experiencing the trauma at an early age (e.g., Cloitre et al., 2009). Individuals who experience complex trauma are at increased risk of developing PTSD, but also exhibit a multitude of other psychological symptoms and psychopathologies (Greeson et al., 2011; Kisiel et al., 2014; Wamser-Nanney & Vandenberg, 2013). No single diagnosis in the DSM-V can capture the complex array of symptoms seen in these individuals (Van der Kolk et al., 2009). As a result, Developmental Trauma Disorder (DTD) was developed to help diagnostically conceptualize complex trauma reactions in children (Van der Kolk, 2005; Van der Kolk et al., 2009).

Developmental Trauma

Van der Kolk proposed a separate diagnosis of DTD to circumvent the issues surrounding PTSD diagnoses in children and offer a developmentally appropriate conceptualization of complex trauma reactions seen in children (Van der Kolk, 2005). It has been argued that DTD captured the developmental consequences of childhood trauma that were not reflected in the diagnostic criteria of PTSD (Van der Kolk, 2005). DTD accounts for the caregiving environment of the child and encompasses the range of disturbances trauma has on the development of self-regulatory capacities across a variety of domains (D'Andrea et al., 2012). Specifically, the diagnostic criteria as outlined by Van der Kolk and colleagues (2009) for DTD include: 1) Expose to multiple or prolonged aversive events in childhood or adolescence; 2) Dysregulation in affect and physiological reactions; 3) Dysregulation in behaviour and attention; 4) Dysregulation in self-perception and relationships; 5) Post-traumatic spectrum symptoms; 6) Duration of symptoms for at least 6 months; and 7) Functional impairment.

Similarly, Cook and colleagues (2005) defined seven domains of impairment associated with developmental trauma. These include attachment (e.g., social isolation), affect regulation

(e.g., difficulty with emotional self-regulation), dissociation (e.g., depersonalization and derealization), behavioural control (e.g., oppositional behaviour), biology (e.g., increased medical problems), cognition (e.g., difficulties regulating attention and executive functioning), and self-concept (e.g., low self-esteem).

Despite the clinical utility of the DTD diagnosis and compelling research to suggest that the PTSD diagnosis alone cannot account for the range of complex trauma reactions in children, the proposal to include DTD in the DSM-V was denied (Schmid, et al., 2013; Van der Kolk et al., 2009). There are few studies that have examined the validity of the DTD construct, due to the novelty of the proposed DTD diagnosis. Of the limited studies that exist, promising results have emerged to provide preliminary phenomenological support for DTD as a diagnosis. Stolbach and colleagues (2013) found that children who had complex trauma histories as outlined by the DTD diagnostic criteria exhibited more DTD symptoms compared to other-trauma exposed children without complex trauma histories. Similarly, Kisiel and colleagues (2014) found that children with a complex trauma history, who were exposed to violent or attachment-based traumas by caregivers, had higher levels of symptom severity across DTD diagnostic domains than children who did not experience caregiver related trauma. These studies provide early support for DTD as a diagnostic entity. However, further research on the effects of trauma reactions in children with complex trauma histories are necessary to provide the empirical foundation to support the theoretical framework of developmental trauma.

Additionally, although DTD accounts for developmental factors in the clinical presentation of children who experience aversive life events, there is no age-specificity stipulated in the diagnostic criteria (Schmid, et al., 2013; Van der Kolk et al., 2009). A review of research on traumatic stress responses and psychopathology in children has suggested that the symptom

presentations of traumatized children are dependent on age (Pynoos et al., 2009; Van der Kolk et al., 2005). As children mature, the symptoms they exhibit will increasingly become more similar to the symptoms seen in adults with PTSD (Van der Kolk et al., 2005). However, there have been no studies that have examined how DTD symptoms differ across different age groups, such as between young children and adolescents. Given the chronicity and lifelong consequences of experiencing childhood maltreatment, there is a need to understand the developmental course of trauma related psychopathology in children.

Developmental Trauma Framework

Van der Kolk and colleagues (2009) posited six forms of self-regulation difficulties and presence of post-traumatic spectrum symptoms in their proposed diagnosis for DTD (see Figure 1). Similarly, Cook and colleagues (2005) also suggested seven domains of impairment that are demonstrated in children who were exposed to complex trauma. Both reports encompassed a similar range of symptoms, with some modifications to the ways in which symptoms were categorized. One major difference between the two reports was the inclusion of criteria for post-traumatic spectrum symptoms in Van der Kolk and colleagues' proposed DTD diagnosis. Cook and colleagues (2005) did not have a separate domain for specific PTSD symptoms and instead had a domain for dissociative symptoms.

The present study used a developmental framework adapted from both Van der Kolk and colleagues' (2009) proposed DTD diagnostic categories and Cook and colleagues' (2005) domains of impairment in children exposed to complex trauma. The framework in the present study maintains Van der Kolk and colleagues' (2009) post-traumatic spectrum symptoms as a separate domain that also incorporates dissociative symptoms. Additionally, attentional

dysregulation in Van der Kolk and colleagues' (2009) criteria is incorporated into a cognitive dysregulation domain in the present study.

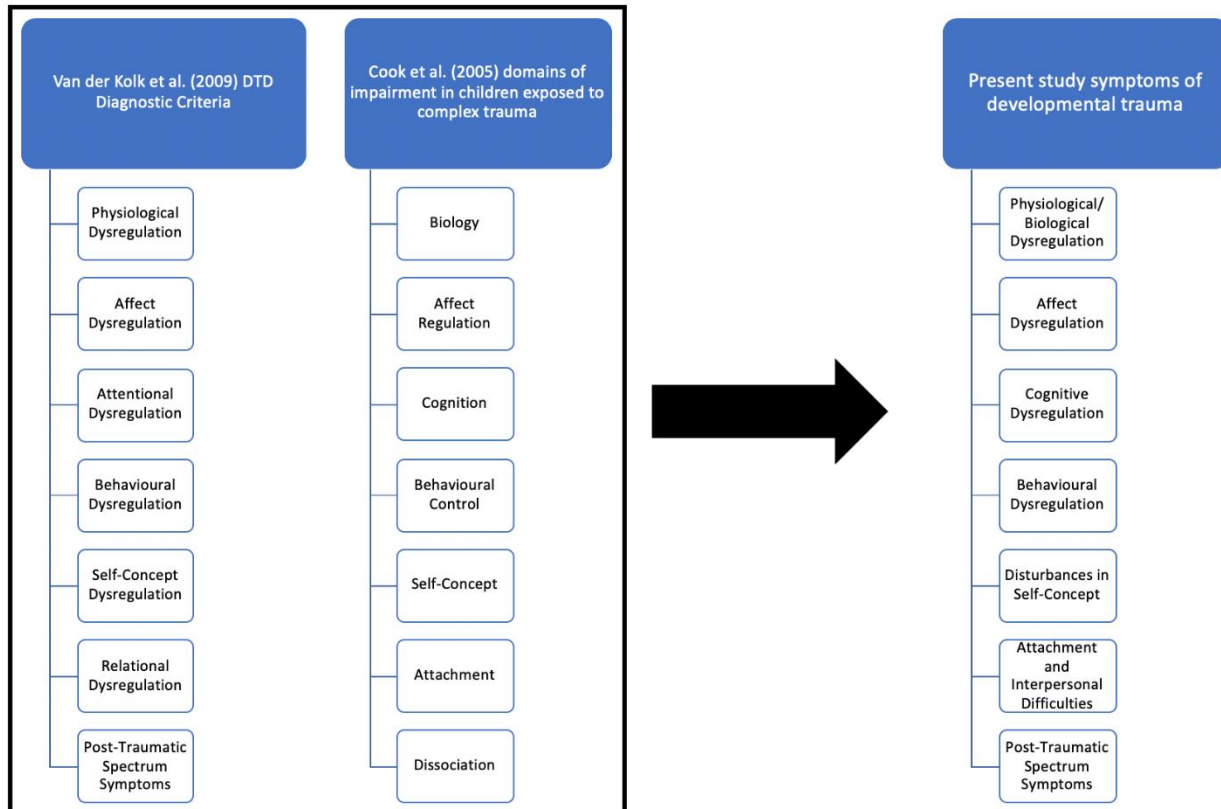


Figure 1: Developmental trauma framework for the present study adapted from Van der Kolk et al. (2009) proposed DTD diagnostic criteria and Cook et al. (2005) domains of impairment in children exposed to complex trauma.

Using clinical data collected from children and adolescent mental health agencies in Ontario Canada over the past six years, the present study explored whether children who have experienced maltreatment exhibit symptoms that reflect dysregulation in the seven domains of the DTD framework: affect dysregulation, behavioural dysregulation, interpersonal and attachment difficulties, disturbances in self-concept, cognitive dysregulation, physiological/biological dysregulation, and post-traumatic spectrum symptoms. This exploratory study examines whether clinical data will reflect symptoms clusters consistent with the developmental trauma framework and determine whether there is preliminary support for the theoretical construct of DTD. There is an extensive body of research that have documented the effects of chronic childhood trauma across these broad domains.

Affect Dysregulation

Affect regulation involves the ability to effectively modulate one's emotions and arousal state for contextually adaptive functioning (Eisenberg et al., 2010). Maltreatment has been shown to disrupt the development of psychological, cognitive, and biological systems involved with effective affect regulation (Ford, 2017). Young children develop emotion regulation through attachment to primary caregivers. Infants and toddlers have limited capacity to self-regulate emotions and rely on responsive caregivers to meet both basic survival and emotional needs (Eisenberg et al., 2010). Thus, the regulation of emotions in early life is largely externally driven through appropriate responses from caregivers. As children age, they acquire the necessary skills to regulate their own emotions through the quality of attachment and interpersonal responsivity from their environment. Complex trauma involves disruption to the caregiver relationship, the primary source by which children acquire affect regulation abilities (Van der Kolk et al., 2005). Literature have accumulated over the past few decades that link

affect dysregulation to a myriad of internalizing and externalizing difficulties including depression (Schierholz et al., 2016), anxiety (Pynoos et al., 1999), borderline personality disorder (Luyten et al., 2019), substance use (Simons et al., 2017), suicidality (Bekh Bradley et al., 2011), and severity of PTSD symptoms (Eisenberg et al., 2010; Ford, 2017). Affect dysregulation appears to have a mediation effect between exposure to complex trauma in childhood and the increased risk of developing psychopathology (Heleniak, et al., 2016).

The ability to regulate emotions and express emotional states is age dependent (Eisenbere et al., 2010). Thus, developmental factors influence the affective symptoms that manifest as a result of trauma. The impact of trauma on affect may become more evident as children mature and develop the ability to display and communicate complex emotional states (e.g., blunted affect, anxiety, depression) and articulate the impact that the trauma has on their worldviews (e.g., foreshorten sense of future, hopelessness). Although the age dependency of affective symptoms in relation to trauma has been noted in several studies (Eisenbere et al., 2010), age specific criteria to evaluate affective symptoms in response to trauma have not been identified.

Behavioural Dysregulation

Similarly, behavioural difficulties are also common among children who have experienced trauma. A litany of research has linked early trauma exposure to substance use (Simons et al., 2017), externalizing problems (Carliner et al., 2017), eating disorders (Messman-Moore & Garrigus, 2007), self-harm (Ford & Gómez, 2015) and conduct issues (Duke et al., 2010; Moffitt & Caspi, 2001). Ford and colleagues (2010) found that youth who have directly experienced interpersonal trauma (e.g., assault, abuse) were more likely to have a psychiatric diagnosis and engage in delinquent behaviours compared to youth who experience non-interpersonal type traumas (e.g., accident, witness to violence). This suggests that in addition to

trauma exposure, the degree of traumatization and victimization places children at greater risk to anti-social behaviours (Wilson et al., 2009). The impact of prolonged trauma on self-regulatory capacities and executive functioning (e.g., inhibitory control) may underlie the prevalence of behavioural difficulties found among chronically traumatized children and adolescents (Simons et al., 2017). Furthermore, there are developmental differences in the expression of behavioural responses to trauma. Younger children tend to exhibit more behavioural symptoms in response to trauma compared to older children. Since young children have less capacity to articulate and understand their emotional states, stress reactions may be expressed through more overt means (e.g., irritability, overt aggression, destructiveness, re-enactment of trauma through play; Dyregrov & Yule, 2006). Older children and adolescents may exhibit more complex behavioural challenges (e.g., substance use, self-harm behaviours, risk-taking behaviours) that are more similar to adult manifestations of trauma reactions and externalizing psychopathology (Dyregrov & Yule, 2006). Despite this, limited research has examined the developmental course of behavioural challenges in children who experience chronic trauma.

Interpersonal and Attachment Difficulties

Decades of developmental research has substantiated the role secure attachment to a primary caregiver has on the healthy child development. Therefore, it is unsurprising that problems in the caregiver-child relationship has been linked to the development of different forms of psychopathology and negative developmental outcomes (Cicchetti & Doyle, 2016; Nolte et al., 2011). John Bowlby's Attachment Theory proposed that behavioural and affective challenges in children has etiological roots to disrupted attachments to caregivers (Bretherton, 1992). Children with parents that were unresponsive to their needs, inconsistent, and emotionally distant, are at greater risk to develop insecure attachment styles (i.e., ambivalent, avoidant, and

disorganized attachments; Bretherton, 1992). A meta-analysis examining attachment patterns found that institutionalized children were at greater risk for insecure attachment styles; only 26% of institutionalized children were securely attached compared to 56% in a non-institutionalized control group (Lionetti et al., 2015). In the context of trauma, perpetrators of child maltreatment are typically individuals with whom the child has a trusting relationship. Based on data from the CIS, 83.1% of substantiated child maltreatment cases in Canada involved the primary caregiver as the perpetrator (Taillieu et al., 2019; Trocmé, 2010). Therefore, children who have been maltreated are at increased risk for insecure attachment styles and exhibit more attachment difficulties. Child attachment issues were documented in 14% of Canadian maltreatment cases (Trocmé, 2010). To meet definition for complex trauma, the trauma experienced must include some disruption to the caregiver system (Van der Kolk, 2005). Thus, problems associated with attachment are inherent to the experience of complex trauma itself.

The DSM-V included Reactive Attachment Disorder (RAD) to characterize the clinical presentations of children who have been neglected, abused, or experienced disruptions to care (e.g., changes in parental status or foster placement; APA 2013). To meet criteria for RAD the child must demonstrate the following: 1) inhibited and withdrawn behaviour towards adults and caregivers; 2) social and emotional dysregulation; and 3) have experienced insufficient care (e.g., neglect, maltreatment). RAD is considered a trauma-related and stress related condition for children. However, a major difference between RAD and DTD is the specificity of criteria. RAD includes affective and attachment-based difficulties in children, whereas DTD considers the impact of trauma on behaviour and several other domains (e.g., self-concept, physiology). The narrow criteria to warrant a RAD diagnosis may not capture the true psycho-social-bio impact of complex trauma on development. Instead, recommendations for clinicians diagnosing RAD

include monitoring for other affective, behavioural, and cognitive disturbances, and considering comorbid diagnoses when necessary (Ellis & Saadabadi, 2019).

Although insecure attachment by itself is not considered a form of psychopathology, research has found that disrupted attachment increases the risk for pathological sequelae throughout development (Sroufe et al., 1999). A plethora of literature have documented the association between insecure attachment and negative developmental outcomes in children (Fearon et al., 2010; Sroufe et al., 1999). Furthermore, insecure attachment in early childhood has been found to persist into attachment and interpersonal difficulties in adolescents and adulthood (Doyle & Cicchetti, 2017; Obsuth et al., 2014). Disorganized attachment in infancy has been associated with poor relational interactions with caregivers in adolescents. Accordingly, the quality of adolescent-caregiver relational interactions is also associated with quality of romantic relationships and risk of intimate partner abuse (Obsuth et al., 2014). This pattern of interpersonal and relational difficulties can extend into adulthood where adults with insecure/dismissing, insecure/preoccupied or unresolved attachment types are also more likely to report negative early childhood experiences (e.g., rejection), poor relational habits (e.g., interpersonal distancing), and less satisfaction with the quality of their relationships (Doyle & Cicchetti, 2017). Given the sequelae of disrupted attachment, symptoms of attachment dysregulation and interpersonal difficulties are an important domain to consider when assessing the impact of complex trauma.

Disturbances in Self-Concept

It is known that childhood trauma disrupts the development of an integrated self-concept and a positive view towards the 'self' (Fletcher, 2011; Luyten et al., 2019; Saigh et al., 2008). As children mature, they start to develop an integrated sense of identity and concept of themselves.

The presence of a nurturing environment with responsive caregivers provides the opportunity to develop positive self-esteem and allows children to construe themselves as worthwhile and competent individuals. In the context of childhood trauma, the environments that the child is exposed to often does not allow for this positive developmental process to occur. Instead early experiences of trauma, rejection, and threats to safety perpetuates the development of a negative sense of self as unlovable, flawed, and lacking agency (Cook et al., 2005; Teague, 2013).

Childhood victimization often perpetuates feelings of shame and guilt. These feelings mediate the relationship between trauma exposure and the risk of adverse outcomes (Fletcher, 2011).

Accordingly, Turner and colleagues (2017) found that reduced self-esteem and mastery mediates the relationship between poly-victimization and emotional distress among youths ages 10-17.

Research has demonstrated an association between childhood trauma and the development of reduced self-esteem, mastery, and an altered perception of oneself and one's abilities (Fletcher, 2011; Tuner et al., 2017). Thus, self-concept disturbances are an important construct to consider when examining the developmental effects of complex trauma on children and adolescents.

Cognitive Dysregulation

Research has demonstrated a substantiated association between childhood trauma exposure and increased risk for psychosis and dissociative symptoms (Dalenberg et al., 2011; Evans et al., 2015; Luyten et al., 2019). Dissociative symptoms function as a way for the body to cope with excessive stress by allowing an individual to emotionally and cognitively distance themselves from their traumatic experiences (Dalenberg et al., 2011). Dissociation is also a cognitive process that often involves alterations to thoughts and perceptions; hence it has been implicated in the development of psychotic symptoms and personality disorders (Dalenberg et al., 2011; Luyten et al., 2019). Several studies have found significant associations between

childhood trauma and risk for psychosis, even after controlling for other factors (e.g., family history of psychosis; Read et al., 2008). Thus, cognitive disturbances in thoughts and perceptions may be an important aspect to consider when conceptualizing developmental trauma presentations in children and adolescents.

Furthermore, complex trauma has been also shown to interfere with the development of key cognitive abilities (e.g., executive functioning, memory, IQ, perception; Bückner et al., 2012; Teague, 2013). Cognitive development is a process that involves the gradual maturation of brain structures and is influenced by a multitude of psycho-social-bio factors (Nelson & Carver, 1998). Trauma can influence the development of these brain structures leading to impairments in key cognitive domains (Pechtel & Pizzagalli, 2011; Teague, 2013). Children who experience early life trauma are more likely to exhibit poor academic performance, lower scores on cognitive batteries, and difficulties in executive functioning (Pechtel & Pizzagalli, 2011). Bückner and colleagues (2012) found lower scores on attention, working memory and immediate recall in school-aged children who were exposed to trauma. Similarly, Enlow and colleagues (2012) prospectively assessed the impacts of interpersonal trauma exposure on intelligence test scores of over 200 children who were followed longitudinally from birth to 8 years of age. They found that children who experienced trauma had consistently reduced test scores compared to children who had not. These findings indicate the need to assess for cognitive dysregulations when working with children who have been exposed to complex trauma.

Physiological/Biological Dysregulation

According to the framework of developmental trauma, early life adversities influences development at a physiological (e.g., the body's stress response system) and biological level (e.g., the maturation of brain structures; Teague, 2013). Research has linked childhood trauma to

a multitude of physiological and hormonal changes in bodily systems, along with structural and neurochemical changes in the brain (Teague, 2013). Trauma disrupts homeostasis and affects the body's stress response system (Solomon & Heide, 2005; Teague, 2013; Weber & Reynolds, 2004). Jaffee and colleagues (2015) found that early life stressors have lasting effects on the cortisol reactivity level in children. Prolonged stress in childhood influences the reactivity of the hypothalamic-pituitary-adrenal (HPA) axis, which dictates the body's reactivity and response to future stressors. Increased reactivity of the body's stress-response over time is associated with hyperarousal, sleep difficulties, various health conditions or physical ailments (e.g., hypertension, somatoform symptoms; Teague, 2013; Twardosz & Lutzker, 2010; Weber & Reynolds, 2004). Moreover, developments in neuroimaging has allowed for research into how the brain develops when exposed to complex trauma. Effects of trauma on the structure and reactivity of several brain regions (e.g., hippocampus volume, amygdala) and neural pathways have been implicated (Twardosz & Lutzker, 2010; Weber & Reynolds, 2004). As a result, a comprehensive model of developmental trauma should take into consideration both physiological and psychological symptom clusters.

Current Study

The present study used a developmental framework to conceptualize how developmental trauma symptoms manifest in children and adolescents. This study explored whether children and adolescents who were exposed to complex trauma (e.g., maltreatment) exhibited impairments that reflects the diagnostic and theoretical models postulated by Van der Kolk et al., (2009) and Cook et al., (2005). Specifically, the present study examined whether the symptom presentations of children with a history of developmental trauma include physiological/biological dysregulation, affect dysregulation, cognitive dysregulation, behavioural dysregulation,

disturbances in self-concept, attachment and interpersonal difficulties, and post-traumatic spectrum symptoms. The present study also aimed to identify whether trauma symptoms differ by age (i.e., school-aged children and adolescents) and whether there are clinical differences in children who have experienced complex trauma and those who have not. This contributes to the understanding of the developmental effects of trauma in children and adolescents who have experienced maltreatment. Understanding symptom presentations of complex trauma at different stages of development will inform the establishment of developmentally appropriate interventions for children and adolescents accessing mental health treatments across Canada.

Objectives and Hypotheses

The present study explores the manifestation of symptoms related to complex trauma for school-age children and adolescents. The present study aimed to: 1) Determine whether there is a difference in clinical presentation of children who experienced complex trauma and those who have not; and 2) Explore the trauma-related symptomology present in school-aged children (i.e., 4-11) and adolescence (i.e., 12-18), for children who have experienced complex trauma.

Methods

Procedure

Electronic administrative data and data from the Child and Youth Mental Health Instrument (ChYMH; Stewart & Hamza, 2017) was obtained from child and youth mental health agencies across Ontario. The ChYMH is a standardized intake measure, commonly used as standard practice across provincial child and youth mental health centres. It informs treatment planning and addresses mental health needs in children. This instrument is carried out via a semi-structured interview with the child and parents or legal guardians of the child. Participants with completed ChYMH data were divided into two age groups: school-aged children (i.e., 4-11) and

adolescents (i.e., 12-18) for data analysis. Clinical items on the ChYMH were selected based on fit to the domains of interest from the developmental trauma framework (i.e., behavioural dysregulation, affect dysregulation, attachment and interpersonal difficulties, disturbances in self-concept, and post-traumatic spectrum symptoms). Exploratory factor analyses (EFA) were conducted on selected ChYMH items to determine the underlying factor structures of clinical items and how symptoms cluster for each age group (i.e., 4-11 and 12-18). Factor scores were generated for each participant based on results from the EFAs. The factor scores were used as predictors in discriminant function analyses (DFA) to determine whether extracted EFA factors scores can discriminate between children and adolescents who have experienced complex trauma and those who have not. The present study has been approved by the Western University Research Ethics Board and the University of Waterloo Office of Research Ethics.

Participants

The present study used data from the ChYMH obtained from child and youth mental health agencies across Ontario for 15, 435 children and adolescents between the ages of 4-18 who have used mental health services between the years 2013 to 2015. Children in the present study were included if they had a completed ChYMH with no missing values for clinical items that were selected for the EFA. Ninety-four percent of the children and adolescents in the sample ($n = 14, 507$) had a completed ChYMH. Children in this sample was divided into two developmental stages for analyses purposes: 1) school-age children (i.e., ages 4 to 11; $n = 4, 756$); and 2) adolescents (i.e., ages 12 to 18; $n = 7, 464$).

ChYMH

Symptom presentations of complex trauma at different ages was explored using data from the ChYMH (Stewart & Hamza, 2017). The ChYMH is an instrument within a group of

assessments developed by an international network of researchers to provide standardized assessments across different health-care service sectors such as hospitals, long-term care facilities, and community health settings (Stewart et al., 2015). This instrument is completed by staff in child and youth mental health agencies during or shortly after intake.

The ChYMH is a standardized comprehensive measure used to assess children's mental health needs across a broad range of community and residential settings (Stewart & Hamza, 2017; Stewart et al., 2015). This assessment is completed through a semi-structured interview that evaluates child functioning and mental health needs across 19 domains (i.e., Mental State Indicators, Strengths and Resilience, Family and Social Relations). For youths 12 and over, an adolescent supplement (ChYMH-A) is also completed along with the standard ChYMH assessment.

Analysis of the psychometric properties of the instrument have been completed with clinical samples (Stewart & Hamza, 2017). The ChYMH evidenced strong internal consistency with a Cronbach's alpha that was greater than .70 for most subscales (Stewart & Hamza, 2017). Furthermore, significant correlations between ChYMH subscales and scales within the Brief Child and Family Phone Interview (BCFPI; Boyle et al., 2009) and the Child and Adolescent Functional Assessment Scale (CAFAS; Hodges, 1997) were found, indicating good criterion validity of ChYMH subscales (Stewart & Hamza, 2017).

Complex Trauma

Van der Kolk (2005) defined complex trauma as the experience of prolonged, chronic, developmentally aversive events that are often interpersonal in nature and involve the disruption of the caregiver system. For the present study, items on the ChYMH were selected based on this definition of complex trauma. All selected items measured some form of maltreatment or

neglect. Selected items were either part of the Stress and Trauma or the Intake and Initial History domains of the ChYMH. Selected items from the Stress and Trauma domain includes physical abuse, sexual abuse, emotional abuse, abandonment by parent(s) or caregiver(s), and/or witnessing domestic violence. Responses on these ChYMH items were coded based on the manual guidelines in terms of recency as follows: 0 (Never), 1 (More than 1 year ago), 2 (31 days-1 year ago), 3 (8-30 days ago), 4 (4-7 days ago), and 5 (in last 3 days). Items from the Intake and Initial History domain includes emotional neglect, neglect of physical needs, and neglect of safety needs. Responses on these ChYMH items were coded based on the manual guidelines in terms of the child's age at which the neglect first occurred: 0 (None), 1 (0-4), 2 (5-11), and 3 (12-18). All complex trauma items were collapsed into a dichotomous variable and participants were coded as 0 (has not experienced complex trauma) and 1 (has experienced complex trauma). Children and adolescents in the present study were coded as 1 (has experienced complex trauma) if they were coded 1 or greater to any of the aforementioned complex trauma items from the Stress and Trauma (i.e., physical abuse, sexual abuse, emotional abuse, abandonment by parent(s) or caregiver(s), and/or witnessing domestic violence) and Intake and Initial History (i.e., emotional neglect, neglect of physical needs, and neglect of safety needs) domains.

Items Selected for Developmental Trauma Framework

Items from the ChYMH were selected based on compatibility with the developmental trauma framework domains derived from the DTD criteria proposed by Van der Kolk and colleagues (2009) and domains of impairment posited in Cook and colleagues' (2005) model of complex trauma in children (see Figure 2). Specifically, clinical items from the ChYMH and ChYMH-A supplement were selected based on fit to the analyses (i.e., continuous and non-

binary items) and the following developmental trauma domains: affect dysregulation (e.g., mood disturbance - sad, pained, or worried facial expressions), cognitive dysregulation (e.g., anxiety – obsessive thoughts), behavioural dysregulation (e.g., behaviour symptoms - socially inappropriate or disruptive behaviour), disturbances in self-concept (e.g., mood disturbance – self-deprecation), and attachment and interpersonal difficulties (e.g., behaviour symptoms – resists care). Furthermore, experts in the field were consulted to help with categorization of each item by domain and determine the appropriateness of including each ChYMH item for the present study.

<p style="text-align: center;">Affect Dysregulation</p> <ul style="list-style-type: none"> • Anhedonia – expressions including nonverbal of lack of pleasure in life • Withdrawal from activities of interest • Lack of motivation • Repetitive anxious concerns • Unrealistic fears • Sad, pained, worried facial expression • Crying, tearfulness • Irritability • Decreased energy • Labile affect • Flat or blunted affect <p>Adolescent Only Items</p> <ul style="list-style-type: none"> • Self-reported mood - anxious, restless or uneasy • Self-reported mood – little interest or pleasure in things you normally enjoys • Self-reported mood – sad, depressed or hopeless 	<p style="text-align: center;">Behavioral Dysregulation</p> <ul style="list-style-type: none"> • Destructive behaviour towards property • Outbursts of anger • Impulsivity • Hyperactivity • Inflated self-worth • Pressured speech • Sleep problems due to hypomania • Hypersexuality • Violent ideation • Extreme behaviour disturbance • Considered performing a self-injurious act • Self-injurious behaviour • Stealing • Elopement attempts/threats • Preoccupation of violence • Argumentativeness • Defiant behaviour • Uses Caffeine or energy drinks • Smokes tobacco daily • Uses other nicotine product • Problem video gaming • Problem internet use • Expression supportive of criminal activity • Most recent self-injurious attempt • Fire setting or misuse of ignition materials or accelerants • Cruelty to animals • Extreme risk-taking • Repetitive lying • Regressive behaviour • Compulsive behavior • Inappropriate sexual behaviour or public disrobing • Difficulties adjusting to sexuality or sexual orientation <p>Adolescent Only Items</p> <ul style="list-style-type: none"> • Cocaine or crack • Stimulants • Opiates • Cannabis • Withdrawal symptoms • Alcohol – highest number of drinks in one sitting in last 14 days • Number of days in last 30 days consumed alcohol to intoxication • Inhalant • Hallucinogens • Making or selling drugs • Driving under the influence • Illegally entering premises • Engaging in anti-social behavior
<p style="text-align: center;">Attachment and Interpersonal Difficulties</p> <ul style="list-style-type: none"> • Verbal abuse • Physical abuse • Socially inappropriate/disruptive • Converses only in specific social situations • Lack of interest in social interactions • Ability to understand others • Resists care • Violence to others • Bullying peers • Intimidation or threatened violence • Denies or minimizes harm done to others • Parent's degree of insight into child's mental health problems 	
<p style="text-align: center;">Cognitive Dysregulation</p> <ul style="list-style-type: none"> • Cognitive skills for daily decision making • Disorganization • Easily Distracted • Delusions • Hallucinations • Command hallucinations • Abnormal thought processes • Episodes of disorganized speech • Obsessive thoughts 	
<p style="text-align: center;">Dysregulation in Self-Concept</p> <ul style="list-style-type: none"> • Self-deprecation • Guilt/shame • Hopelessness • Negative statements 	
<p style="text-align: center;">Post-Traumatic Spectrum Symptoms</p> <ul style="list-style-type: none"> • Intrusive thoughts or flashbacks • Episodes of panic • Hypervigilance • Nightmares • Re-enactment through play of traumatic life events 	<p style="text-align: center;">Physiological/Biological Dysregulation</p> <ul style="list-style-type: none"> • Difficulty falling asleep or staying asleep • Wakes multiple times at night • Falls asleep during the day - exclude naptime • Resists bedtime • Repetitive health complaints • Phonic Tics

Figure 2: ChYMH Items Included in Analyses

Note. Items were categorized based on fit to the construct domains of the developmental trauma framework.

Ethical Considerations

Several ethical considerations were taken into account when conducting the present study. Children and parents are informed about the potential use of their data during the time of intake at a child and youth mental health agency. Consent was obtained by staff who conducted the interRAI ChYMH assessment at child and youth mental health agencies, based on the specific agency's procedure for obtaining consent. All data were de-identified. Specifically, case record numbers (CRNs) are randomly assigned to children involved in the study at the time of assessment to anonymize the data. Confidentiality was enforced by keeping electronic data password protected and accessible only on computers in the research lab.

Based on policy differences and staff training at different mental health agencies, there may be differences with how the interRAI ChYMH interview was performed. Results from the present study should be interpreted with respect to these considerations.

Finally, the present study examines sensitive topics related to child maltreatment and trauma which may be distressing to researchers working with the data. Opportunities for debriefing between researchers involved on the project will be available throughout the duration of the study.

Data Analyses

Data analyses were carried out using IBM SPSS software (version 25). The aim of this study was to explore the symptom structures of children and adolescents who have experienced maltreatment as it relates to the developmental trauma framework. Descriptive statistics were completed for demographic variables and participant characteristics. Exploratory factor analyses (EFA) were conducted to evaluate the underlying factors of clinical items selected from the ChYMH. All items selected from the ChYMH will were entered in an EFA to explore age-

specific symptom clusters for all children and adolescents who have a completed ChYMH. Factor scores for all participants will be derived from the EFA results. Factor scores were entered into discriminant function analyses (DFA) to determine whether scores on the underlying factors could reliably differentiate between children and adolescents who have experienced maltreatment and those who have not. Moreover, separate analyses (i.e., EFA and DFA) were conducted for school-aged children (i.e., ages 4-11) and adolescents (i.e., 12-18) to explore whether there is a difference in symptom structures by age.

Results

Descriptive Data and Participant Characteristics

The final sample includes 14,507 children and adolescents between the ages of 4-18 ($M = 12.28$; $SD = 3.55$) who have a completed ChYMH (see Table 1). Fifty-five percent of the total sample identified as female, 44% as male, and 0.2% as other. There were 5,756 children between the ages of 4-11 ($M = 8.61$; $SD = 1.86$); 69% female and 31% male. There were 7,464 adolescents between the ages of 12-18 ($M = 14.81$; $SD = 1.78$); 56% female, 43% male, and 0.4% identified as other.

Overall, 7,333 (51%) of participants in the final sample had experienced complex trauma. The most common types of trauma were witnessing domestic violence (29%) and emotional abuse (28%), followed by physical abuse (19%), emotional neglect (15%), abandonment by parent or caregiver (15%), neglect of safety needs (12%), sexual abuse (11%), and neglect of physical needs (10%). In the 4-11 age group, 2,602 (45%) children have experienced complex trauma. Similarly, the most common types were witnessing domestic violence (30%) and emotional abuse (21%). Other trauma types include physical abuse (14%), emotional neglect (15%), abandonment by parent or caregiver (14%), neglect of safety needs (12%), sexual abuse

(5%), and neglect of physical needs (10%). Complex trauma was more prevalent in the 12-18 age group where 4,071 (54%) adolescents were identified as having experienced at least one form of maltreatment. The most common types of trauma among adolescents in the sample were emotional abuse (33%) and witnessing domestic violence (27%). Other trauma types include physical abuse (23%), emotional neglect (15%), abandonment by parent or caregiver (16%), neglect of safety needs (12%), sexual abuse (15%), and neglect of physical needs (10%).

Table 1: Participant Characteristics and Descriptive Data

		<u>All Participants</u> <i>N</i> = 14, 507	<u>Ages 4-11</u> <i>N</i> = 4, 756	<u>Ages 12-18</u> <i>N</i> = 7, 464
		<i>M(SD)</i> or <i>N(%)</i>		
Age		12.37 (3.54)	8.61 (1.86)	15.09 (1.66)
Sex	Male	6452 (44.5)	1776 (30.9)	4193 (56.2)
	Female	8022 (55.3)	3079 (69.1)	3240 (43.4)
	Other	33 (0.2)	1 (0)	31 (0.4)
	Total	7333 (50.5)	2602 (45.2)	4071 (54.5)
Complex Trauma	Physical Abuse	2743 (18.9)	805 (14.0)	1685 (22.6)
	Sexual Abuse	1562 (10.8)	325 (5.6)	1110 (14.9)
	Emotional Abuse	4039 (27.8)	1215 (21.1)	2457 (32.9)
	Abandoned by parent or caregiver	2190 (15.1)	799 (13.9)	1155 (15.5)
	Witnessed domestic violence	4143 (28.6)	1714 (29.8)	2044 (27.4)
	Emotional neglect	2231 (15.4)	843 (14.6)	1147 (15.4)
	Neglect of physical needs	1489 (10.3)	597 (10.4)	731 (9.8)
	Neglect of safety needs	1760 (12.1)	700 (12.2)	870 (11.7)

Exploratory Factor Analyses

Two EFAs, one for each age-group (i.e., 4-11 and 12-18), were conducted to determine the factor structure of clinical ChYMH items for children and adolescents. The Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and the Bartlett's test of sphericity was completed to examine whether the data and variables selected met assumptions for an EFA. Principal Axis Factoring was used because the purpose of the present study is to identify whether the underlying latent factors that account for the common variance amongst clinical ChYMH items reflect the dimensions proposed by a developmental trauma framework (i.e., affect dysregulation, behavioural dysregulation). Both EFAs were conducted with an oblimin rotation to allow for correlations among extracted factors. Factor scores for all participants were generated based on the factors extracted in the final solution for both age groups.

School-aged Children

EFA results for school-aged children (ages 4-11). The Kaiser-Meyer-Olkin (KMO) test of sampling adequacy was 0.934. This is above the recommended minimum of 0.7 which suggests that there is a high proportion of the variance within the data that may be accounted for by underlying factors. The Bartlett's test of sphericity was significant, ($\chi^2 (2278) = 115859.9, p < .001$) indicating variables in the EFA have sufficient intercorrelations amongst each other to allow for factor analysis.

Examination of the initial eigenvalues suggest that the first seven factors accounted for 18.1%, 23.4%, 27.0%, 30.2%, 33.1%, 35.5%, and 37.7%, of the variance, respectively. The generated scree plot indicates a four to seven factor structure. Solutions for a five-, six-, and seven-factor model were examined. The five-factor model accounted for 28.1% of the variance, the six-factor model accounted for 29.7%, and the seven-factor model accounted for 31.2%.

The seven-factor model accounted for 1.5% of the variance more than the six-factor model. Additionally, only four items (i.e., difficulty falling asleep or staying asleep .306, problem internet use 0.694, resists bedtime .313, and problem video gaming .714) loaded on to factor five in the model. When comparing the five- and six-factor models, both had constructs that were interpretable; however, the six-factor model offered more construct complexity and better reflected the domains of the developmental trauma framework. Thus, a six-factor model structure was selected to maximize interpretability of the factors while maintaining complexity of the constructs, and to ensure there were sufficient item loadings on each factor.

A varimax rotation, which maintains the orthogonality of the extraction and maximizes interpretability, was first applied to the five-factor solution. An oblimin rotation with Kaiser normalization, which allows for correlations among factors, was subsequently applied to examine the factor structure when correlations are permitted among factors. Examination of the five-factor model with both the varimax and oblimin rotations showed little difference between the two solutions. Both rotations resulted in a few items that loaded on to more than one factor above the 0.3 level. Thus, the oblimin rotation was selected for the final solution to allow for correlations among factors.

The final solution was a six-factor model with an oblimin rotation and accounted for 29.7% of the total variance (see Table 2). The factors that were extracted represented the following constructs: factor 1) dysregulation in cognitive processes, factor 2) dysregulation in self-concept, 3) externalizing behaviours, 4) violent or high-risk behaviours, 5) indicators of withdrawal and depression, and 6) hyperarousal and anxiety behaviours. Factor scores for all children ages 4-11 in the final sample were generated based on these extracted factors.

Table 2: Factor Loadings of ChYMH Items with an Oblique Rotation for School-Aged Children

	<u>Fac1</u>	<u>Fac2</u>	<u>Fac3</u>	<u>Fac4</u>	<u>Fac5</u>	<u>Fac6</u>
Factor 1: Dysregulation in cognitive processes						
1. pressured speech or racing thoughts	0.360					
2. episodes of disorganized speech	0.484					
3. demonstrates excessive naivete	0.380					
4. hallucinations	0.351					
5. command hallucinations	0.404					
6. delusions	0.470					
7. abnormal thought processes	0.472					
Factor 2: Dysregulation in self-concept						
1. sad, pained or worried expression	0.435					
2. crying, tearfulness	0.326					
3. made negative statements	0.604					
4. self-deprecation	0.610					
5. expressions of shame or guilt	0.533					
6. expressions of hopelessness	0.518					
7. considered performing self-injurious act	0.317			-0.587		
Factor 3: Externalizing behaviours						
1. labile affect				-0.317		

2. outbursts of anger	-0.737
3. demonstrates limited understanding of consequences of behaviour	-0.395
4. irritability	-0.596
5. hyperactivity	-0.513
6. denies or minimizes harm done to others	-0.330
7. verbal abuse	-0.664
8. physical abuse	-0.587
9. socially inappropriate or disruptive behaviour	-0.406
10. destructive behaviour towards property	-0.490
11. defiant behaviour	-0.772
12. argumentativeness	-0.749
13. repetitive lying	-0.374
14. easily distracted	-0.491
15. disorganization	-0.413

Factor 4: Violent or high-risk behaviours	
1. preoccupation with violence	-0.410
2. elopement attempts	-0.338

3. expressions supportive of criminal activity		-0.328
4. self-injurious behaviour		-0.350
5. more recent self-injurious attempt	0.317	-0.547
6. considered performing self-injurious act		-0.587
7. violence to others		-0.526
8. violent ideation		-0.540
9. intimidation or threatened violence towards others		-0.553
10. extreme behaviour disturbance		-0.312
<hr/>		
Factor 5: Indicators of withdrawal and depression		
<hr/>		
1. flat or blunted affect		0.350
2. problem internet use		0.358
3. lack of interest in social interactions		0.627
4. lack of motivation		0.666
5. anhedonia		0.590
6. withdrawal from activities of interest		0.588
7. decreased energy		0.380
8. problem video gaming		0.338
<hr/>		
Factor 6: Hyperarousal and Anxiety Behaviours		
<hr/>		
1. difficulty falling asleep		0.553
<hr/>		

2. resists bedtime	0.372
3. repetitive anxious complaints or concerns	0.380
4. expressions, including non-verbal, of what appears to be unrealistic fears	0.487
5. obsessive thoughts	0.317
6. episodes of panic	0.478
7. wakes multiple times at night	0.562
8. nightmares	0.530
9. hypervigilance	0.415
10. intrusive thoughts or flashbacks	0.383

Adolescents

An EFA was completed to examine the factor structure of ChYMH items for adolescents (ages 12-18). The KMO test of sampling adequacy was 0.933, above the recommended minimum of 0.7. This indicates that there is sufficient variance in the data that can be accounted for by underlying factors. The Bartlett's test of sphericity was significant, ($\chi^2 (4278) = 128961.9$, $p < .001$) indicating there is sufficient correlations among items to allow for factor analysis.

Examination of the initial eigenvalues suggest that the first six factors accounted for 13.3%, 22.1%, 27.5%, 30.3%, 32.8%, and 35.0%, of the variance, respectively. The generated scree plot indicates a five-seven factor structure. Solutions for a four-, five-, and six-factor model

were examined. The four-factor model accounted for 27.3% of the variance, the five-factor model accounted for 29.3%, and the six-factor model accounted for 30.9%.

When comparing the four- and five-factor models, both had constructs that were interpretable, but the five-factor model offered more construct complexity and better reflected the domains of the developmental trauma framework. Specifically, in the four-factor solution, items that indicated disturbances in thought processes and affect regulation difficulties were combined into a single factor whereas in the five-factor model, two distinct factors emerged (i.e., affect dysregulation and hyperarousal and dysregulation in thought processes). Thus, a five-factor model structure was selected to maximize interpretability of the factors, while maintaining complexity of the constructs and ensuring that each factor can account for a greater proportion of the variance.

A varimax rotation, which maintains the orthogonality of the extraction and maximizes interpretability, was first applied to the five-factor solution. An oblimin rotation with Kaiser normalization, which allows for correlations among factors, was subsequently applied to examine the factor structure when correlations are permitted among factors. Examination of the five-factor model with both the varimax and oblimin rotations showed little differences between the two solutions. Both rotations resulted in a few items that loaded on to more than one factor above the 0.3 level. Thus, the oblimin rotation was selected for the final solution to allow for correlations among factors.

The final solution was a five-factor model with an oblimin rotation and accounted for 29.3% of the total variance (see Table 3). The factors that were extracted represented the following constructs: factor 1) externalizing behaviours, factor 2) affect dysregulation, 3) substance use, 4) withdrawal and indicators of depression, and 5) hyperarousal and dysregulation

in cognitive processes. Factor scores for adolescents ages 12-18 in the final sample were generated based on these extracted factors.

Table 3: Factor Loadings of ChYMH Items with an Oblique Rotation for Adolescents

	<u>Fac1</u>	<u>Fac2</u>	<u>Fac3</u>	<u>Fac4</u>	<u>Fac5</u>
Factor 1: Externalizing behaviours					
1. preoccupation with violence	0.363				
2. resists care	0.362				
3. outburst of anger	0.754				
4. demonstrated limited understanding of consequences to behaviour	0.621				
5. stealing	0.464				
6. elopement attempts or threats	0.420				
7. bullying peers	0.510				
8. irritability	0.467	0.467			
9. expressions support of criminal activity	0.408		0.344		
10. demonstrates excessive naivete	0.394				
11. hyperactivity	0.417				
12. denies or minimizes harm to others	0.657				
13. inflated self-worth	0.400				
14. verbal abuse	0.797				
15. physical abuse	0.669				

16. socially inappropriate or disruptive behaviours	0.574		
17. destructive towards property	0.667		
18. defiant behaviour	0.778		
19. argumentativeness	0.751		
20. extreme risk-taking	0.378		
21. repetitive lying	0.601		
22. violence to others	0.538		
23. violent ideation	0.425		
24. intimidation of others or threatened violence	0.690		
25. easily distracted	0.304		
26. disorganization	0.415		
27. argumentativeness	0.519		
<hr/>			
Factor 2: Affect Dysregulation			
<hr/>			
1. irritability	0.467	0.358	
2. repetitive anxious complaints or concerns		0.304	
3. episodes of panic		0.383	0.311
4. sad, pained, or worried facial expressions		0.489	
5. crying, tearfulness		0.568	
6. decreased energy		0.319	0.489
7. made negative statements		0.658	
8. self-deprecation		0.650	
<hr/>			

9. expressions of guilt or shame	0.566	
10. expression of hopelessness	0.595	
11. self-injurious behaviour	0.353	
12. more recent self-injurious attempt	0.531	
13. considered performing self-injurious act	0.617	
14. nightmares	0.305	0.305
15. intrusive thoughts or flashbacks	0.310	0.367
16. self-reported - anxious, restless, or uneasy	0.434	
17. self-reported – little interest or pleasure in things you normally enjoy	0.381	0.391
18. self-reported – sad, depressed, or hopeless	0.575	
<hr/> Factor 3: Substance Use <hr/>		
1. expressions supportive of criminal activity	0.408	0.344
2. smokes tobacco daily		0.597
3. making or selling drugs		0.589
4. driving under the influence		0.362
5. illegally entering premises		0.440
6. highest number drinks in any one sitting in last 14 days		0.593
7. number of days in last 30 days consumed alcohol to the point of intoxication		0.620
8. time since use of hallucinogens		0.607
9. times since use of cocaine		0.646

10. time since use of stimulants		0.571
11. time since use of opiates		0.463
12. time since use of cannabis		0.658
13. withdrawal symptoms		0.441
<hr/>		
Factor 4: Hyperarousal and Dysregulation in Thought Processes		
<hr/>		
1. pressured speech or racing thoughts		0.378
2. episodes of disorganized speech		0.350
3. expression of what appears to be unrealistic fears		0.322
4. obsessive thoughts		0.372
5. compulsive behaviours		0.345
6. episodes of panic	0.383	0.311
7. hallucinations		0.435
8. command hallucinations		0.354
9. nightmares	0.305	0.305
10. hypervigilance		0.321
11. intrusive thoughts or flashbacks	0.319	0.367
12. delusions		0.448
13. abnormal thought processes		0.432
<hr/>		
Factor 5: Withdrawal and indicators of depression		
<hr/>		
1. flat or blunted affect		0.378
2. difficulty falling or staying asleep		0.307
3. problem internet use		0.373
<hr/>		

4. falls asleep during the day		0.314
5. lack of interest in social interactions		0.652
6. lack of motivation		0.700
7. expressions including non-verbal of lack of pleasure in life – anhedonia		0.591
8. withdrawal from activities of interest		0.597
9. decreased energy	0.319	0.489
10. problem video gaming		0.361
11. self-reported – little interest or pleasure in things you normally enjoy	0.381	0.391

DFA

Two DFAs were conducted to determine whether factor scores generated from the final solutions of the EFAs can differentiate between children and adolescent who have experienced complex trauma and those with no reported complex trauma histories. Separate DFAs were conducted based on factor scores for school-aged children (i.e., 4-11) and adolescents (i.e., 12-18).

School-aged Children

A DFA was conducted to determine whether factor scores from the final solution of the EFA can predict whether a child has a history of complex trauma. Factor scores from the following factors were used as predictors in the DFA: factor 1) dysregulation in cognitive processes, factor 2) dysregulation in self-concept, 3) externalizing behaviours, 4) violent or high-risk behaviours, 5) indicators of withdrawal and depression, and 6) hyperarousal and anxiety

behaviours. The resulting function from the DFA significantly differentiated between children who have experienced complex trauma and children who have no reported complex trauma history, *Wilk's Λ* = 0.93; χ^2 (6) = 432.2, $p < .001$. The function correctly classified 61.5% of cases.

Adolescents

A DFA was conducted to determine whether factor scores from the final solution of the EFA completed on adolescents can predict whether the individual has a history of complex trauma. Factor scores from the following factors were used as predictors in the adolescent DFA: factor 1) externalizing behaviours, factor 2) affect dysregulation, 3) substance use, 4) withdrawal and indicators of depression, and 5) hyperarousal and dysregulation in cognitive processes. The resulting function from the DFA significantly differentiated between adolescents who have experienced complex trauma and those who have no reported complex trauma history, *Wilk's Λ* = 0.92; χ^2 (5) = 657.9, $p < .001$. The function correctly classified 63.7% of cases.

Discussion

The present study is exploratory in nature and aims to examine the clinical presentation of stress reactions among school-aged children and adolescents who have experienced complex trauma. Furthermore, this study aimed to determine whether the clinical presentation of stress reactions contained symptom clusters that reflected the domains postulated in the developmental trauma framework, adapted from Van der Kolk and colleagues' (2009) proposed criteria for DTD and Cook and colleagues' (2005) domains of impairment for children who have experienced complex trauma. Considering previous research in developmental trauma, the factor structures of clinical items on the ChYMH, for children and adolescents, are congruent with the domains of the developmental trauma framework. Children and adolescents who have

experienced maltreatment were hypothesized to display a factor structure that reflects dysregulation in affect, behaviour, and interpersonal and attachment difficulties. In the present study, six factors emerged for school-aged children (i.e., dysregulation in cognitive processes, dysregulation in self-concept, externalizing behaviours, violent or high-risk behaviours, indicators of withdrawal and depression, and hyperarousal and anxiety behaviours) and five factors for adolescents (i.e., externalizing behaviours, affect dysregulation, substance use, withdrawal and indicators of depression, and hyperarousal and dysregulation in cognitive processes). Although the selected ChYMH items did not factor into the exact domains that were predicted, the factors that emerged for both children and adolescents align well with the developmental trauma framework used in the present study and the body of research that examines the sequelae of complex trauma on development. Items factored together in ways that aligned with the constructs of the developmental trauma framework but did not necessarily group together in the ways in that were originally hypothesized (see Figure 2).

Presentation of Developmental Trauma in School-Aged Children

The first factor for school-aged children, *dysregulation in cognitive processes*, contain items that indicates disorganized thinking, behaviours that reflect non-linear cognitive processes, or disturbances in perception. This factor demonstrates the degree to which the child exhibits symptoms related to psychosis or disrupted cognitive processes that may be an early indicator of more severe mental illness. The link between childhood trauma and later development of psychosis has been found in several studies (Evans et al., 2015; Janssen et al., 2004). Dose response relationships between severity or frequency of childhood trauma and the risk of developing psychosis symptoms have also been demonstrated (Read et al., 2008). Furthermore, Janssen and colleagues (2004) found that the relationship between the development of psychosis symptoms and childhood trauma is mediated by the ways in which the traumatic experience disrupts the development of self-concept.

This leads into the second factor, *dysregulation in self-concept*, which contains items that indicate disruptions in self-esteem and self-worthiness as hypothesized by the developmental trauma framework. However, this factor also contained indicators of depression and self-harm. This aligns with research that has demonstrated how experiences of childhood trauma affects the development of a positive and integrated sense of self (Janssen et al., 2004). The experience of adverse events during childhood is noted to disrupt the development of a positive view of the *self* and a sense of self-efficacy (Saigh et al., 2008; Turner et al., 2017). The *self-concept dysregulation* factor in the present study provides preliminary support for such a domain in the developmental trauma framework.

Unlike the behavioural dysregulation domain in the developmental trauma framework that encompassed a board range of problem behaviours, items in the present study grouped

together to form two behavioural factors: a general *externalizing behaviours* factor and a *violent or high-risk behaviours* factor. The *externalizing behaviours* factor contain items that are related to disruptive, aggressive, and defiant behaviours in children; most often overt behaviours easily recognizable by caregivers and teachers (e.g., outbursts of anger, distractibility). The *violent and high-risk behaviours* factor includes items that may be early indicators of delinquent, violent or impulsive behaviours. Previous research suggests there are different types of externalizing behaviours in childhood. Frick and colleagues (1993) completed a meta-analysis encompassing over 60 studies and classified four types of externalizing behaviours in children: aggression (e.g., assault, bullying), oppositional (e.g., defiant, argues, angry), property violations (e.g., vandalism, lies), and status violations (e.g., runaway, substance use). In the present study, the *externalizing behaviours* factor contain more items that reflect Frick and colleagues' (1993) oppositional and property violations behaviour subtypes, whereas the *violent and high-risk behaviour* factor contain more items that reflect the aggression and status violation behaviour subtypes. The present study indicates that *externalizing behaviours* and *violent and high-risk behaviours* form two distinct factors that can be used to predict whether a child has experienced maltreatment. This is consistent with the literature which has shown an association between childhood trauma with both externalizing behaviours and delinquency/criminality (Carliner et al., 2017; Ford et al., 2010). However, there is little research that examines how trauma is implicated in the type of externalizing behaviour that a child may exhibit and the developmental trajectory of that form of externalizing behaviour. Thus, more research in this area is needed to better understand the connection between trauma and the development of different types of externalizing problems in children.

Similarly, it was predicted that a factor that can be construed as affect dysregulation would emerge based on the developmental trauma framework. Two factors that reflect affect dysregulation, *indicators of withdrawal and depression* and *hyperarousal and anxiety behaviours*, were identified in the present study. *Indicators of withdrawal and depression* speaks to the degree to which a child displays depression symptoms related to social and emotional withdrawal, low or blunted moods, and decreased energy or interest in activities. This differentiates from the *dysregulation in self-concept* factor which contains items that may also indicate depression but are generally more self-evaluative in nature or have a stronger emphasis on the self (e.g., self-deprecation). In the *hyperarousal and anxiety behaviours* factor, items that point to post-traumatic spectrum symptoms grouped together with items that demonstrate anxiety and sleep difficulties. Based on the developmental trauma framework, post-traumatic spectrum symptoms should form a separate factor; however, no such factor emerged in the present study. Post-traumatic spectrum symptoms items did, however, factor together with items reflecting anxiety and sleep disturbances. Previous research has shown that the stress reactions of younger children tend to contain more overt behavioural signs (Dyregrov & Yule, 2006; Scheeringa et al., 2011). Thus, symptoms of hyperarousal and anxiety-like behaviours may more easily be identifiable in children than other more covert post-traumatic spectrum symptoms (e.g., dissociation). The emergence of the *hyperarousal and anxiety behaviours* factor suggests that post-traumatic stress reactions in children may closely resemble symptoms of anxiety.

Distinct factors that show the underlying constructs of biological/physiological dysregulation and attachment/interpersonal difficulties did not emerge as hypothesized. One reason for this may be the lack of items on the ChYMH that could be grouped under those domains and were still a fit for the analyses. Furthermore, many of the items that fit with the

biological/physiological dysregulation and attachment/interpersonal difficulties domains could also fit under other domains in the developmental trauma framework. For example, the item *lack of interest in social interactions* was grouped under the attachment/interpersonal difficulties domain but could have also been categorized under the affect dysregulation domain since it is a common symptom of depression. This item ended up factoring on to the *withdrawal and indicators of depression* factor.

Presentation of Developmental Trauma in Adolescents

The factors that emerged for adolescents who have experienced complex trauma were similar to those of school-aged children with a few notable differences. General *Externalizing behaviours* and *affect dysregulation* factors emerged and contained a broader range of items for adolescents compared to children. A *withdrawal and indicators of depression* factor, similar to the one that emerged for school-aged children, is also present for adolescents. The *hyperarousal and dysregulation in cognitive processes* factor combined items pertaining to anxiety, hypervigilance, and disturbances in thinking and perception (e.g., hallucinations). As reflected in the factor results from the school-aged children subgroup and due to similar reasons, items from the attachment and interpersonal difficulties and physiological/biological dysregulation domains of the developmental trauma framework did not group together to form distinct factors among adolescents. Although not all items factored together in ways that were expected, the factors that emerged are consistent with the proposed developmental trauma framework domains.

The first factor, *externalizing behaviours*, consists of an expansive range of items concerning problematic behaviours. Items under this factor consists of all four types of externalizing behaviours (i.e., aggression, oppositional, property violations, and status violations) classified by Frick and colleagues' (1993). Both general externalizing items and items related to

delinquency and violence grouped together into one large factor of *externalizing behaviours* for the adolescent sub-group; whereas for school-aged children, two separate factors were found (i.e., *externalizing behaviours* and *violent and high-risk behaviours*). This indicates that there are greater associations among different types of externalizing behaviours in adolescents compared to children. Thus, adolescents who have experienced maltreatment may exhibit a broader range of externalizing problems, encompassing oppositional, aggressive, delinquent, and high-risk behaviours, compared to children. This factor aligns with the behavioural dysregulation domain in the developmental trauma framework which consists of all-encompassing behavioural items from the ChYMH.

One deviation from the developmental trauma framework was found to be *substance use*, which emerged as a distinct factor separate from externalizing behaviours. The substance use factor reflects the degree to which an adolescent who has experienced complex trauma used substances and engaged in criminal activity motivated by substances (e.g., driving under the influence). This is consistent with the breadth of research that has shown the link between early trauma and problem substance use (e.g., De Bellis, 2002; Ramos-Olazagasti et al., 2017; Wu et al., 2010). Substance use as a way to self-medicate in order to reduce emotional distress is prevalent among youth who have a trauma history (Garland, Pettus-Davis, & Howard, 2013). In addition, higher endorsement of PTSD symptoms in childhood are linked to the earlier onset of alcohol use in pre-teens (Wu et al., 2010). In the present study, the *substance use* factor emerged for only the adolescent age-group. One reason for this may be the limited substance-related items in the ChYMH itself, since the majority of substance use items were from Adolescent Supplement. Therefore, there were minimal items that examined substance use in the school-aged children sub-group.

Two factors emerged that are relevant to the affect dysregulation domain of the developmental trauma framework: a *withdrawal and indicators of depression* factor and a general *affect dysregulation* factor. The factor, *indicators of withdrawal and depression* contains similar items to the one found in school-aged children. It indicates the extent to which the adolescent displays social and emotional withdrawal behaviours, low or blunted moods, and lack of energy or interest in activities. This is consistent with a body of research that suggests an association between childhood trauma with the early on-set and persistence of depressive disorders (Braithwaite et al., 2017; Hopfinger et al., 2016). Furthermore, Nanni and colleagues (2012) found that children who have experienced maltreatment were twice as likely than children who have no history of maltreatment to develop persistent and recurrent episodes of depression. Although items did not factor together into one cohesive affect dysregulation domain as hypothesized, the *indicators of withdrawal and depression* factor in the present study nonetheless provides preliminary support for the developmental trauma framework by demonstrating that adolescents who have experienced trauma display dysregulation in affect (e.g., depressive symptoms). In contrast to the specificity of the items in the *indicators of withdrawal and depression* factor, the general *affect dysregulation* factor contained a wide range of items related to affect, depression, self-concept, anxiety, and post-traumatic spectrum symptoms. This factor combined items from the affect dysregulation, post-traumatic spectrum symptoms, and the dysregulations in self-concept domain of the developmental trauma framework. Items in this factor were also broader in scope compared to the *affect dysregulation* factor for school-aged children. Thus, this may indicate that adolescents who have experienced maltreatment may be exhibiting more identifiable emotional distress that is apparent across several domains (e.g., self-concept, affect, post-traumatic spectrum symptoms) compared to

children. Several items in this factor also overlap with the *withdrawal and indicators of depression*, and *hyperarousal and dysregulation in cognitive processes* factors. Previous studies have demonstrated that as children mature, trauma reactions change from more behavioural symptoms (e.g., angry outbursts) to incorporate more emotional and self-concept related perturbations (Dyregrov & Yule, 2006; Scheeringa et al., 2011). This may account for why the *affect dysregulation* factor for adolescents contained broader items from different developmental trauma domains compared to the *affect dysregulation* factor for school-aged children.

The final factor *hyperarousal and dysregulation in thought processes*, contains items that reflects coherence of thought processes, alterations in perception, disturbances in thought patterns, along with items that indicate anxiety symptoms. Items in this factor reflect the presence of cognitive and perceptual disturbances that may be indicative of psychosis or other forms of mental illness. It was hypothesized that analyses will reveal a cognitive dysregulation factor that reflects the cognitive dysregulation domain in the developmental trauma framework. However, items in this domain grouped together differently than what was predicted. Items in the cognitive domain factored together with some items pertaining to anxiety and post-traumatic spectrum symptoms. This may suggest that individuals who experience post-traumatic spectrum symptoms and hyperarousal may also experience disruptions to thought processes and perception. Accordingly, there is considerable research that demonstrates an association between early traumatization and subsequent development of psychosis-like symptoms (Evans et al., 2015; Read et al., 2008).

Discriminating Children and Adolescents with Complex Trauma Histories

The present study aimed to determine whether children who are in the mental health system and have experienced complex trauma can be discriminated from those who have not

experienced trauma. The results indicate that discrimination of whether maltreatment history was present based on factor scores were 61.5% accurate for school-aged children and 63.7% for adolescents. Thus, the present study was able to accurately classify children' and adolescents' group membership accurately beyond random chance. However, there remains a large portion of the variance unaccounted for, indicating that the presence or absence of complex trauma alone cannot account for the variability in factor scores among this sample. There is considerable research that has demonstrated that the relationship between trauma exposure and psychological adjustment is not clear-cut. Research in developmental science and resiliency over the past few decades have illustrated that the relationship between adversity and psychological outcomes is compounded by a multitude of risk and protective factors (Wright et al., 2013).

From a developmental systems perspective, development is determined by the interactions between the child and various ecological networks (Bowers et al., 2014; Lerner & Overton, 2008; Overton, 2013). Examples of ecological networks include social networks (e.g., family and peers), institutions that the child is involved with (e.g., school), and access to resources (e.g., mental health care). Development is dependent on the interactions between multiple systems. In the context of developmental trauma, factors within the child and ecological networks interact to mitigate or promote the effects of trauma on development. Development then impacts the future interactions the child will have within their ecological systems. For example, trauma may influence the parent-child attachment relationship. Disrupted attachment may lead to increased child behavioural problems, which then influences the future interactions the child has within their ecological networks (e.g., family and school).

Accordingly, risk and protective factors at the individual, interpersonal, and community level interact to promote or reduce the effects of trauma on the developmental trajectory of the

child or youth (Masten, 2018). Hence, risk and protective factors at various levels of influence, that involve individual traits, interpersonal networks, and community systems, should be taken into consideration when examining the developmental trajectories of children and adolescents who have experienced trauma (Masten, 2018).

Limitations

The findings in this study should be interpreted with consideration to some limitations. Firstly, there were large variations in the number of items that were categorized under each domain of the developmental trauma framework. Specifically, some domains had very little items that were a fit (e.g., physiological/biological dysregulation). This may have had an effect on the overall factor structure. Some factors may not have emerged, not because the construct is not a good fit to developmental trauma, but rather there were not enough items under that domain to accurately capture the construct being studied.

Secondly, the ChYMH is an already developed measure (Stewart et al., 2015). Items were selected from the measure based on fit to constructs on the developmental trauma framework and analyses. This resulted in some items on the ChYMH being omitted due to poor fit to the analyses despite being relevant to the developmental trauma framework itself.

Another limitation is the wide range of ages in each age group defined in the present study (i.e., school-age children 4-11 and adolescents 12-18). The effect of this may be more pronounced among the school-age children (i.e., 4-11) sub-group. There is evidence to suggest that trauma reactions present differently in younger children (i.e., pre-school) compared to older school-aged children (Dyregrov & Yule, 2006). Thus, children may have more variations in clinical presentations of trauma compared to adolescents. Further research with more

differentiated age-groups for children may be necessary to gather more specificity for the developmental sequelae of complex trauma reactions.

Future Directions

Further research on developmental trauma, as a phenomenon and clinically relevant construct, is necessary to address limitations and expand upon the preliminary findings of the present exploratory study. An important next step would be to conduct tests of reliability and validity for the factor structures that were found. This will provide further conceptual understanding of developmental trauma and whether the clinical data fits the theoretical model posited. In addition, due to limited items available on the ChYMH that were a fit for certain domains (i.e., physiological/biological dysregulation and interpersonal and attachment difficulties) certain domain constructs may have been underrepresented. Future studies may need to incorporate more items or data that pertain to those less represented domain constructs in order to determine the relevance of these constructs to the overall phenomenon of developmental trauma.

Furthermore, the discriminate function analyses conducted in the present study tried to distinguish between children/adolescents who have experienced complex trauma and children/adolescents who have not. However, the discrimination is based off of factor structures of children from a clinical sample. Essentially the present study is trying to discriminate children from a clinical sample who have experienced trauma from children from a clinical sample who have not. This has clinical implications for the screening and recognition of children presenting at mental health services. Greater understanding of how children who experience complex trauma present clinically can help inform interventions and target treatments to meet the needs of these children and youth. However, from a diagnostic and phenomenological perspective, in

order to gather empirical evidence for a Developmental Trauma type diagnosis, research that compares children from a clinical sample who have experienced complex trauma to children from a non-clinical sample who have not experienced trauma (i.e., using healthy development as a control group/baseline group) may need to be conducted.

Implications

The present study gives preliminary support for the construct of developmental trauma; specifically, the developmental trauma framework which identifies the clinically relevant domains that are impacted by the experience of complex trauma for children and adolescents. This has implications for practice and research. Deeper understanding of the construct of developmental trauma can lead to more efficient identification, treatment planning, and efficiency in connecting children and adolescents to evidence-based interventions. In addition, research in this area is foundational to the construction of a developmental trauma-type diagnosis. There is growing support that DTD, as a diagnostic entity, better captures the broad impacts and symptom presentations of complex trauma reactions in children and adolescents (Van der Kolk, 2005). This is especially important given the shortcomings of the recognized trauma-related diagnoses currently available (D'Andrea et al., 2012; Van der Kolk, 2005).

The present study has shown that over half of the children and adolescents presenting to mental health services in Ontario have a history of maltreatment. This has implications for policy and resource allocation. Results from this study highlights how complex trauma impacts children across several psycho-social domains. Thus, it is important for child welfare agencies and children's mental health services to have resources allocated towards interventions that can target the areas that complex trauma has been shown to have an effect (e.g., affect dysregulation, substance use, externalizing behaviours, violent and high-risk behaviours).

Furthermore, the present study has implications for how the ChYMH can be used in research and treatment planning for children and adolescents who have experienced complex trauma. The ChYMH is used in children's mental health settings for treatment planning, screening, and case conceptualization purposes (Stewart & Hamza, 2017; Stewart et al., 2015). The present study has shown how information on the ChYMH can be used also to conceptualize and identify the range of psycho-social domains (i.e., behavioural dysregulation, affect dysregulation) that are impacted in children who experience complex trauma. Adding this piece on developmental trauma to the ChYMH may be an area of further development for the measure and a way to expand the use of the ChYMH for treatment planning.

Conclusion

Overall, there is a need for continued research into the model of developmental trauma in order to gain a better conceptual understanding of the clinical manifestation of complex trauma in children and adolescents. This study contributes to the growing body of literature that examines the constellation of symptom presentations identified in children and adolescents who have experienced complex trauma. Exploratory results from the present study suggests that there are age differences in the presentation of trauma reactions between school-age children and adolescents. Hence, further research in this area is a necessary step towards the conceptualization of a developmentally sensitive model of trauma-related reactions in children that is stipulated by age. Understanding the age-specific symptom presentations of trauma will inform the establishment of developmentally appropriate interventions for children and adolescents accessing mental health services across Canada.

Reference

- Afifi, T. O., MacMillan, H. L., Boyle, M., Taillieu, T., Cheung, K., & Sareen, J. (2014). Child abuse and mental disorders in Canada. *Canadian Medical Association Journal*, 186(9), 324-332.
- Afifi, T. O., MacMillan, H. L., Taillieu, T., Turner, S., Cheung, K., Sareen, J., & Boyle, M. H. (2016). Individual-and relationship-level factors related to better mental health outcomes following child abuse: Results from a nationally representative Canadian sample. *The Canadian Journal of Psychiatry*, 61(12), 776-788.
- Alisic, E., Jongmans, M. J., van Wesel, F., & Kleber, R. J. (2011). Building child trauma theory from longitudinal studies: A meta-analysis. *Clinical Psychology Review*, 31(5), 736-747.
- Alisic, E., Zalta, A. K., Van Wesel, F., Larsen, S. E., Hafstad, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: Meta-analysis. *The British Journal of Psychiatry*, 204(5), 335-340.
- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub.
- American Psychiatric Association. (1980). Diagnostic and Statistical Manual of Mental Disorders (3rd ed.). Washington, DC: Author.
- Ballard, E. D., Van Eck, K., Musci, R. J., Hart, S. R., Storr, C. L., Breslau, N., & Wilcox, H. C. (2015). Latent classes of childhood trauma exposure predict the development of behavioral health outcomes in adolescence and young adulthood. *Psychological Medicine*, 45(15), 3305-3316.

- Bekh Bradley, D., DeFife, J. A., Guarnaccia, C., Phifer, M. J., Fani, M. N., Ressler, K. J., & Westen, D. (2011). Emotion dysregulation and negative affect: association with psychiatric symptoms. *The Journal of Clinical Psychiatry, 72*(5), 685.
- Bowers, E. P., Geldhof, G. J., Johnson, S. K., Lerner, J. V., & Lerner, R. M. (2014). Special issue introduction: Thriving across the adolescent years: A view of the issues. *Journal of Youth and Adolescence, 43*(6), 859.
- Bowlus, A., McKenna, K., Day, T., & Wright, D. (2003). The economic costs and consequences of child abuse in Canada. The Law Commission of Canada.
- Boyle, M. H., Cunningham, C. E., Georgiades, K., Cullen, J., Racine, Y., & Pettingill, P. (2009). The Brief Child and Family Phone Interview (BCFPI): 2. Usefulness in screening for child and adolescent psychopathology. *Journal of Child Psychology and Psychiatry, 50*(4), 424-431.
- Braithwaite, E. C., O'Connor, R. M., Degli-Esposti, M., Luke, N., & Bowes, L. (2017). Modifiable predictors of depression following childhood maltreatment: A systematic review and meta-analysis. *Translational psychiatry, 7*(7), e1162-e1162.
- Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental Psychology, 28*(5), 759.
- Briere, J., Kaltman, S., & Green, B.L. (2008). Accumulated childhood trauma and symptom complexity. *Journal of Traumatic Stress, 21*(1), 223-226.
- Britton, R. S. (1969). Psychiatric disorders in the mothers of disturbed children. *Journal of Child Psychology and Psychiatry, 10*(4), 245-258.

- Bücker, J., Kapczinski, F., Post, R., Ceresér, K. M., Szobot, C., Yatham, L. N., ... & Kauer-Sant'Anna, M. (2012). Cognitive impairment in school-aged children with early trauma. *Comprehensive Psychiatry*, *53*(6), 758-764.
- Carliner, H., Gary, D., McLaughlin, K. A., & Keyes, K. M. (2017). Trauma exposure and externalizing disorders in adolescents: Results from the National Comorbidity Survey Adolescent Supplement. *Journal of the American Academy of Child & Adolescent Psychiatry*, *56*(9), 755-764.
- Cicchetti, D., & Doyle, C. (2016). Child maltreatment, attachment and psychopathology: Mediating relations. *World Psychiatry*, *15*(2), 89.
- Cloitre, M., Stolbach, B. C., Herman, J. L., Kolk, B. V. D., Pynoos, R., Wang, J., & Petkova, E. (2009). A developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress*, *22*(5), 399-408.
- Copeland, W. E., Keeler, G., Angold, A., & Costello, E. J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry*, *64*(5), 577-584.
- Dalenberg, C. J., Brand, B. L., Gleaves, D. H., Dorahy, M. J., Loewenstein, R. J., Cardena, E., ... & Spiegel, D. (2012). Evaluation of the evidence for the trauma and fantasy models of dissociation. *Psychological Bulletin*, *138*(3), 550.
- D'andrea, W., Ford, J., Stolbach, B., Spinazzola, J., & van der Kolk, B. A. (2012). Understanding interpersonal trauma in children: Why we need a developmentally appropriate trauma diagnosis. *American Journal of Orthopsychiatry*, *82*(2), 187.
- De Bellis, M. D. (2002). Developmental traumatology: A contributory mechanism for alcohol and substance use disorders. *Psychoneuroendocrinology*, *27*(1-2), 155-170.

- De Bellis, M. D. (2001). Developmental traumatology: The psychobiological development of maltreated children and its implications for research, treatment, and policy. *Development and Psychopathology*, 13(3), 539-564.
- Doyle, C., & Cicchetti, D. (2017). From the cradle to the grave: The effect of adverse caregiving environments on attachment and relationships throughout the lifespan. *Clinical Psychology: Science and Practice*, 24(2), 203-217.
- Duke, N. N., Pettingell, S. L., McMorris, B. J., & Borowsky, I. W. (2010). Adolescent violence perpetration: Associations with multiple types of adverse childhood experiences. *Pediatrics*, 125(4), e778-e786.
- Dyregrov, A., & Yule, W. (2006). A review of PTSD in children. *Child and Adolescent Mental Health*, 11(4), 176-184.
- Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology*, 6, 495-525.
- Ellis, E. E., & Saadabadi, A. (2019). Reactive Attachment Disorder. In StatPearls [Internet]. StatPearls Publishing.
- Enlow, M. B., Egeland, B., Blood, E. A., Wright, R. O., & Wright, R. J. (2012). Interpersonal trauma exposure and cognitive development in children to age 8 years: A longitudinal study. *Journal of Epidemiology & Community Health*, 66(11), 1005-1010.
- Evans, G. J., Reid, G., Preston, P., Palmier-Claus, J., & Sellwood, W. (2015). Trauma and psychosis: The mediating role of self-concept clarity and dissociation. *Psychiatry Research*, 228(3), 626-632.
- Famularo, R., Fenton, T., Kinscherff, R., & Augustyn, M. (1996). Psychiatric comorbidity in childhood post traumatic stress disorder. *Child Abuse & Neglect*, 20(10), 953-961.

- Fearon, R. P., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Lapsley, A. M., & Roisman, G. I. (2010). The significance of insecure attachment and disorganization in the development of children's externalizing behavior: A meta-analytic study. *Child Development, 81*(2), 435-456.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine, 14*(4), 245-258.
- Fletcher, K. E. (2011). Understanding and assessing traumatic responses of guilt, shame, and anger among children, adolescents, and young adults. *Journal of Child & Adolescent Trauma, 4*(4), 339-360.
- Ford, J. D. (2017). Treatment implications of altered affect regulation and information processing following child maltreatment. *Psychiatric Annals, 35*(5), 410-419.
- Ford, J. D., Elhai, J. D., Connor, D. F., & Frueh, B. C. (2010). Poly-victimization and risk of posttraumatic, depressive, and substance use disorders and involvement in delinquency in a national sample of adolescents. *Journal of Adolescent Health, 46*(6), 545-552.
- Ford, J.D. & Courtois, C.A. (2009). Defining and understanding complex trauma and complex traumatic stress disorder. In C.A. Courtois & J.D. Ford (eds.). *Treating complex traumatic stress disorder*. The Guilford Press, New York NY.
- Ford, J. D., & Gómez, J. M. (2015). The relationship of psychological trauma and dissociative and posttraumatic stress disorders to nonsuicidal self-injury and suicidality: A review. *Journal of Trauma & Dissociation, 16*(3), 232-271.

- Frick, P. J., Lahey, B. B., Loeber, R., Tannenbaum, L., Van Horn, Y., Christ, M. A. G., ... & Hanson, K. (1993). Oppositional defiant disorder and conduct disorder: A meta-analytic review of factor analyses and cross-validation in a clinic sample. *Clinical Psychology Review, 13*(4), 319-340.
- Galatzer-Levy, I. R., Huang, S. H., & Bonanno, G. A. (2018). Trajectories of resilience and dysfunction following potential trauma: A review and statistical evaluation. *Clinical Psychology Review, 63*, 41-55.
- Garland, E. L., Pettus-Davis, C., & Howard, M. O. (2013). Self-medication among traumatized youth: Structural equation modeling of pathways between trauma history, substance misuse, and psychological distress. *Journal of Behavioral Medicine, 36*(2), 175-185.
- Green, B. L., Goodman, L. A., Krupnick, J. L., Corcoran, C. B., Petty, R. M., Stockton, P., & Stern, N. M. (2000). Outcomes of single versus multiple trauma exposure in a screening sample. *Journal of Traumatic Stress, 13*(2), 271-286.
- Greeson, J. K., Briggs, E. C., Kisiel, C. L., Layne, C. M., Ake, G. S., Ko, S. J., & Fairbank, J. A. (2011). Complex trauma and mental health in children and adolescents placed in foster care: Findings from the National Child Traumatic Stress Network. *Child Welfare, 90*(6), 91-108.
- Heleniak, C., Jenness, J. L., Vander Stoep, A., McCauley, E., & McLaughlin, K. A. (2016). Childhood maltreatment exposure and disruptions in emotion regulation: A transdiagnostic pathway to adolescent internalizing and externalizing psychopathology. *Cognitive Therapy and Research, 40*(3), 394-415.
- Herman, J. L., (1992). *Trauma and recovery: The aftermath of violence - from domestic abuse to political terror*. New York, NY: BasicBooks.

- Hodges, K. (1997) CAFAS manual for training coordinators, clinical administrators, and data managers. Ann Arbor, MI: Kay Hodges.
- Hopfinger, L., Berking, M., Bockting, C. L., & Ebert, D. D. (2016). Emotion regulation mediates the effect of childhood trauma on depression. *Journal of Affective Disorders, 198*, 189-197.
- Janssen, I., Krabbendam, L., Bak, M., Hanssen, M., Vollebergh, W., de Graaf, R., & van Os, J. (2004). Childhood abuse as a risk factor for psychotic experiences. *Acta Psychiatrica Scandinavica, 109*(1), 38-45.
- Jaffee, S. R. (2017). Child maltreatment and risk for psychopathology in childhood and adulthood. *Annual Review of Clinical Psychology, 13*, 525-551.
- Jaffee, S. R., McFarquhar, T., Stevens, S., Ouellet-Morin, I., Melhuish, E., & Belsky, J. (2015). Interactive effects of early and recent exposure to stressful contexts on cortisol reactivity in middle childhood. *Journal of Child Psychology and Psychiatry, 56*(2), 138-146.
- Jelicic, H., Bobek, D. L., Phelps, E., Lerner, R. M., & Lerner, J. V. (2007). Using positive youth development to predict contribution and risk behaviors in early adolescence: Findings from the first two waves of the 4-H Study of Positive Youth Development. *International Journal of Behavioral Development, 31*(3), 263-273.
- Kisiel, C. L., Fehrenbach, T., Torgersen, E., Stolbach, B., McClelland, G., Griffin, G., & Burkman, K. (2014). Constellations of interpersonal trauma and symptoms in child welfare: Implications for a developmental trauma framework. *Journal of Family Violence, 29*(1), 1-14.

- Koenen, K. C., Moffitt, T. E., Poulton, R., Martin, J., & Caspi, A. (2007). Early childhood factors associated with the development of post-traumatic stress disorder: Results from a longitudinal birth cohort. *Psychological Medicine*, *37*(2), 181-192.
- Lerner, R. M., Lerner, J. V., Almerigi, J. B., Theokas, C., Phelps, E., Gestsdottir, S., ... & Smith, L. M. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth-grade adolescents: Findings from the first wave of the 4-H study of positive youth development. *The Journal of Early Adolescence*, *25*(1), 17-71.
- Lerner, R. M., & Overton, W. F. (2008). Exemplifying the integrations of the relational developmental system: Synthesizing theory, research, and application to promote positive development and social justice. *Journal of Adolescent Research*, *23*(3), 245-255.
- Lionetti, F., Pastore, M., & Barone, L. (2015). Attachment in institutionalized children: A review and meta-analysis. *Child Abuse & Neglect*, *42*, 135-145.
- Luyten, P., Campbell, C., & Fonagy, P. (2019). Borderline personality disorder, complex trauma, and problems with self and identity: A social-communicative approach. *Journal of Personality*.
- Masten, A. S., & Obradović, J. (2006). Competence and resilience in development. *Annals of the New York Academy of Sciences*, *1094*(1), 13-27.
- Masten, A. S. (2018). Resilience theory and research on children and families: Past, present, and promise. *Journal of Family Theory & Review*, *10*(1), 12-31.
- Magruder, K. M., McLaughlin, K. A., & Borbon, D. L. E. (2017). Trauma is a public health issue. *European Journal of Psychotraumatology*, *8*(1), 1-9.

- McLaughlin, K. A., Koenen, K. C., Hill, E. D., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2013). Trauma exposure and posttraumatic stress disorder in a national sample of adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 52*(8), 815-830.
- Messman-Moore, T. L., & Garrigus, A. S. (2007). The association of child abuse and eating disorder symptomatology: The importance of multiple forms of abuse and revictimization. *Journal of Aggression, Maltreatment & Trauma, 14*(3), 51-72.
- Moffitt, T. E., & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development and Psychopathology, 13*(2), 355-375.
- Nanni, V., Uher, R., & Danese, A. (2012). Childhood maltreatment predicts unfavorable course of illness and treatment outcome in depression: A meta-analysis. *American Journal of Psychiatry, 169*(2), 141-151.
- Nelson, C. A., & Carver, L. J. (1998). The effects of stress and trauma on brain and memory: A view from developmental cognitive neuroscience. *Development and Psychopathology, 10*(4), 793-809.
- Norman, R. E., Byambaa, M., De, R., Butchart, A., Scott, J., & Vos, T. (2012). The long-term health consequences of child physical abuse, emotional abuse, and neglect: A systematic review and meta-analysis. *PLOS Medicine, 9*(11), e1001349.
- Nolte, T., Guiney, J., Fonagy, P., Mayes, L. C., & Luyten, P. (2011). Interpersonal stress regulation and the development of anxiety disorders: An attachment-based developmental framework. *Frontiers in Behavioral Neuroscience, 5*, 55

- Obsuth, I., Hennighausen, K., Brumariu, L. E., & Lyons-Ruth, K. (2014). Disorganized behavior in adolescent–parent interaction: Relations to attachment state of mind, partner abuse, and psychopathology. *Child Development, 85*(1), 370-387.
- Overton, W. F. (2013). A new paradigm for developmental science: Relationism and relational-developmental systems. *Applied Developmental Science, 17*(2), 94-107.
- Pechtel, P., & Pizzagalli, D. A. (2011). Effects of early life stress on cognitive and affective function: An integrated review of human literature. *Psychopharmacology, 214*(1), 55-70.
- Pynoos, R. S., Steinberg, A. M., Layne, C. M., Briggs, E. C., Ostrowski, S. A., & Fairbank, J. A. (2009). DSM-V PTSD diagnostic criteria for children and adolescents: A developmental perspective and recommendations. *Journal of Traumatic Stress, 22*(5), 391-398.
- Pynoos, R. S., Steinberg, A. M., & Piacentini, J. C. (1999). A developmental psychopathology model of childhood traumatic stress and intersection with anxiety disorders. *Biological Psychiatry, 46*(11), 1542-1554.
- Read, J., Fink, P., Rudegear, T., Felitti, V., & Whitfield, C. (2008). Child maltreatment and psychosis: A return to a genuinely integrated bio-psycho-social model. *Clinical Schizophrenia & Related Psychoses, 2*(3), 235-254.
- Ramos-Olazagasti, M. A., Bird, H. R., Canino, G. J., & Duarte, C. S. (2017). Childhood adversity and early initiation of alcohol use in two representative samples of Puerto Rican youth. *Journal of Youth and Adolescence, 46*(1), 28-44.
- Saigh, P. A., Yasik, A. E., Oberfield, R., & Halamandaris, P. V. (2008). The self-concept of traumatized children and adolescents with or without PTSD. *Behaviour Research and Therapy, 46*(10), 1181-1186.

- Santiago, P. N., Ursano, R. J., Gray, C. L., Pynoos, R. S., Spiegel, D., Lewis-Fernandez, R., ... & Fullerton, C. S. (2013). A systematic review of PTSD prevalence and trajectories in DSM-5 defined trauma exposed populations: intentional and non-intentional traumatic events. *PloS One*, 8(4).
- Scheeringa, M. S., Zeanah, C. H., & Cohen, J. A. (2011). PTSD in children and adolescents: Toward an empirically based algorithm. *Depression and Anxiety*, 28(9), 770-782.
- Schierholz, A., Krüger, A., Barenbrügge, J., & Ehring, T. (2016). What mediates the link between childhood maltreatment and depression? The role of emotion dysregulation, attachment, and attributional style. *European Journal of Psychotraumatology*, 7(1), 32652.
- Schmid, M., Petermann, F., & Fegert, J. M. (2013). Developmental trauma disorder: Pros and cons of including formal criteria in the psychiatric diagnostic systems. *BMC Psychiatry*, 13(1), 3.
- Shannon, K. E., Beauchaine, T. P., Brenner, S. L., Neuhaus, E., & Gatzke-Kopp, L. (2007). Familial and temperamental predictors of resilience in children at risk for conduct disorder and depression. *Development and Psychopathology*, 19(3), 701-727.
- Simon, J. B., Murphy, J. J., & Smith, S. M. (2005). Understanding and fostering family resilience. *The Family Journal*, 13(4), 427-436.
- Simons, J. S., Simons, R. M., O'Brien, C., Stoltenberg, S. F., Keith, J. A., & Hudson, J. A. (2017). PTSD, alcohol dependence, and conduct problems: Distinct pathways via lability and disinhibition. *Addictive Behaviors*, 64, 185-193.
- Solomon, E. P., & Heide, K. M. (2005). The biology of trauma: Implications for treatment. *Journal of Interpersonal Violence*, 20(1), 51-60.

- Spinazzola, J., Ford, J. D., Zucker, M., van der Kolk, B. A., Silva, S., Smith, S. F., & Blaustein, M. (2005). National Survey of complex trauma exposure, outcome, and intervention among children and adolescents. *Psychiatric Annals*, 35(5), 433-439.
- Stewart, S. L., & Hamza, C. A. (2017). The Child and Youth Mental Health Assessment (ChYMH): An examination of the psychometric properties of an integrated assessment developed for clinically referred children and youth. *BMC Health Services Research*, 17(1), 82.
- Stewart, S., Hirdes, J., Curtin-Telegdi, N., Perlman, C. M., McKnight, M., MacLeod, K., ... & Berg, K. (2015). *InterRAI child and youth mental health (ChYMH) assessment form and user's manual: For use with in-patient and community-based assessments* (version 9.3). Washington, DC: interRAI.
- Stolbach, B. C., Minshew, R., Rompala, V., Dominguez, R. Z., Gazibara, T., & Finke, R. (2013). Complex trauma exposure and symptoms in urban traumatized children: A preliminary test of proposed criteria for developmental trauma disorder. *Journal of Traumatic Stress*, 26(4), 483-491.
- Taillieu, T. L., Cheung, K., Sareen, J., Katz, L. Y., Tonmyr, L., & Afifi, T. O. (2019). Caregiver vulnerabilities associated with the perpetration of substantiated child maltreatment in Canada: Examining the Canadian incidence study of reported child abuse and neglect (CIS) 2008. *Journal of Interpersonal Violence*, 0-29. DOI: 10.1177/08862051989941.
- Teague, C. M. (2013). Developmental trauma disorder: A provisional diagnosis. *Journal of Aggression, Maltreatment & Trauma*, 22(6), 611-625.
- Trocme, N. (2010). *Canadian incidence study of reported child abuse and neglect, 2008: major findings*. Ottawa: Public Health Agency of Canada.

- Trocmé, N. M., Tourigny, M., MacLaurin, B., & Fallon, B. (2003). Major findings from the Canadian incidence study of reported child abuse and neglect. *Child Abuse & Neglect*, 27(12), 1427-1439.
- Turner, H. A., Shattuck, A., Finkelhor, D., & Hamby, S. (2017). Effects of poly-victimization on adolescent social support, self-concept, and psychological distress. *Journal of Interpersonal Violence*, 32(5), 755-780.
- Twardosz, S., & Lutzker, J. R. (2010). Child maltreatment and the developing brain: A review of neuroscience perspectives. *Aggression and Violent Behavior*, 15(1), 59-68.
- Van der Kolk, B. A., Pynoos, R. S., Cicchetti, D., Cloitre, M., D'Andrea, W., Ford, J. D., ... & Stolbach, B. C. (2009). Proposal to include a developmental trauma disorder diagnosis for children and adolescents in DSM-V. Unpublished Manuscript.
- Van der Kolk, B. A., Roth, S., Pelcovitz, D., Sunday, S., & Spinazzola, J. (2005). Disorders of extreme stress: The empirical foundation of a complex adaptation to trauma. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies*, 18(5), 389-399.
- Van der Kolk, B. (2005). Developmental Trauma Disorder: Toward a rational diagnosis for children with complex trauma histories. *Psychiatric Annals*, 2005, 35(1), 401-408.
- Van der Kolk, B. (2014). *The body keeps the score: Mind, brain and body in the transformation of trauma*. New York, NY: Penguin Books.
- Wamser-Nanney, R., & Vandenberg, B. R. (2013). Empirical support for the definition of a complex trauma event in children and adolescents. *Journal of Traumatic Stress*, 26(6), 671-678.

- Weber, D. A., & Reynolds, C. R. (2004). Clinical perspectives on neurobiological effects of psychological trauma. *Neuropsychology Review*, *14*(2), 115-129.
- Werner, E. (1996). How children become resilient: Observations and cautions. *Resilience in Action*, *1*(1), 18-28.
- Wilson, H. W., Stover, C. S., & Berkowitz, S. J. (2009). Research review: The relationship between childhood violence exposure and juvenile antisocial behavior: A meta-analytic review. *Journal of Child Psychology and Psychiatry*, *50*(7), 769-779.
- Wright, M.O., Masten, A.S., & Narayan, A.J. (2013). Resilience processes in development: Four waves of research on positive adaptation in the context of adversity. In S. Goldstein & R. Brooks (Eds.), *Handbook of resilience in children* (pp. 15-37). Boston, MA: Springer.
- Wu, P., Bird, H. R., Liu, X., Duarte, C. S., Fuller, C., Fan, B., ... & Canino, G. J. (2010). Trauma, posttraumatic stress symptoms, and alcohol-use initiation in children. *Journal of Studies on Alcohol and Drugs*, *71*(3), 326-334.
- Yule, W. (2001). Posttraumatic stress disorder in the general population and in children. *The Journal of Clinical Psychiatry*, *62*, 23-28.

Curriculum Vitae

Name: Annie (Ying) Yang

Post-secondary Education and Degrees:

Honours Psychology B.Sc.
Western University
London, Ontario, Canada
2014-2018

Counselling Psychology M.A.
Western University
London, Ontario, Canada
2018-2020

Publications:

Forchuk, C., Richardson, J., Russell, G., Perreaul, C., Lucyk, B., & **Yang, A.** (in press) The Effectiveness of a Shelter Diversion Intervention for Families Who Experience Homelessness. In Forchuk C. & Csiernik R. (Eds.), *Poverty, Mental Health and Social Inclusion*. Toronto, ON: Canadian Scholars' Press.

Related Work Experience

Research Assistant
Lawson Health Research Institute
Parkwood Institute
2017-2020

Research Assistant
London Health Sciences Centre
Victoria Hospital
2019-2020

Counselling Intern
Psychological Services
Western University
2019-2020

Graduate Student Assistant
Western University
2018-2020

Clinical Placement Student (Psychology)
London Family Health Team
2017-2018