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EXPLORING INDEPENDENT AND CUMULATIVE EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES ON PTSD AND CPTSD: A CROSS-CULTURAL STUDY OF INDIAN AND UGANDAN ADOLESCENTS

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Dissertação apresentada à Faculdade de Ciências da Saúde da Universidade Europeia, para cumprimento dos requisitos necessários à obtenção do grau de Mestre em *Psicologia Clínica e da Saúde* realizada sob a orientação científica do Professor Doutor Paulo Alexandre da Silva Ferrajão, *Professor Auxiliar* da *Universidade Europeia*, e coorientação do Professor Ask Elklit, *Professor da University of Southern Denmark.*

Dedico este trabalho à minha avó Cândida. Obrigado por tudo e espero ter-te feito orgulhosa.

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Abstract

The present study aimed to investigate the independent and cumulative effects of Adverse Childhood Experiences (ACE) exposure on the likelihood of having Post-Traumatic Stress Disorder (PTSD) or Complex Post-Traumatic Stress Disorder (CPSTD) diagnosis in adolescents from Low- and lower-middle-income countries (LALMIC). Data were collected from two samples of 401 Ugandan and 411 Indian adolescents. Multinomial logistic regression analyses were conducted to examine the independent and cumulative effects of ACE on PTSD and CPTSD. Results show that interpersonal ACE had a greater impact on CPTSD in both samples, while a lower cumulative ACE exposure had a bigger impact on the odds for PTSD, and a higher cumulative ACE exposure had a bigger impact on the odds for CPTSD. These results provide insights on the relationship between ACE and PTSD/CPTSD. Future studies should incorporate socio-interpersonal factors in the search for a more comprehensive understanding of this relationship.

Keywords: adverse childhood experiences, post-traumatic stress disorder, complex post-traumatic stress disorder, low- and lower-middle-income countries

Resumo

O presente estudo teve como objetivo investigar os efeitos independente e cumulativo da exposição a Experiências Adversas na Infância (EAI) sobre a probabilidade de diagnóstico de Perturbação de Stress Pós-Traumático (PSPT) ou de Perturbação de Stress Pós-Traumático Complexo (PSPTC) em adolescentes de países de baixo e médio-baixo rendimento (LALMIC). Foram recolhidos dados a partir de duas amostras de 401 adolescentes ugandeses e 411 indianos. Foram efetuadas análises de regressão logística multinominal para examinar os efeitos independentes e cumulativos da EAI na PSPT e na PSPTC. Os resultados mostram que EAI interpessoais tiveram um maior impacto na PSPTC em ambas as amostras, enquanto uma exposição cumulativa mais baixa à EAI teve um maior impacto nas probabilidades de PSPT, e uma exposição cumulativa mais elevada à EAI teve um maior impacto nas probabilidades de PSPTC. Estes resultados vêm elucidar a relação entre a EAI e a PSPT / PSPTC. Estudos futuros devem incorporar fatores socio-interpessoais na procura de uma compreensão mais completa desta relação.

Palavras-chave: Experiências Adversas na Infância, Perturbação de Stress Pós-Traumático, Perturbação de Stress Pós-Traumático Complexo, países de baixo e médio-baixo rendimento

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List of Abbreviations

ACE – Adverse Childhood Experiences

CPSTD – Complex Post-Traumatic Stress Disorder

DSO – Disturbances in Self-Organization

HTQ-IV – Harvard Trauma Questionnaire: Part IV

LALMIC – Low- and lower-middle-income countries

LPA – Latent Profile Analysis

PTSD – Post-Traumatic Stress Disorder

RAAS – The Revised Adult Attachment Scale

TSC – Trauma Symptom Checklist

WHO – World Health Organization

Introduction

Adverse Childhood Experiences (ACE) are developmental experiences that occur before the age of 18 that are not common in normal child development and frequently overwhelm a typical child's normal coping skills (Finkelhor, 2020). These frequently include multiple types of violence and threat exposure (e.g., physical abuse, sexual abuse, bullying, or criminality), as well as various types of deprivation and loss exposure (e.g., parental death, absence, or neglect) (Finkelhor, 2020). Finkelhor et al. (2007) demonstrated that the co-occurrence of multiple forms of ACE is more common than exposure to a single form of ACE, dubbed poly-victimization. Later, Gustafsson et al. (2009) defined polytraumatization as "multiple exposures to different traumatic experiences, regardless of source, rather than repetitive incidents or chronic traumas" (p. 275). Polytraumatization is operationalised through three different approaches: cumulative, hierarchical, and categorical. The hierarchical approach examines the independent effects of different types of ACE on negative outcomes (e.g., sexual is a stronger predictor for PTSD diagnosis than divorce) (Campbell et al., 2016; Stempel et al., 2017). The cumulative approach postulates a dose-response relationship between ACE exposure and negative mental health outcomes (Appleyard et al., 2005). The categorical approach suggests that polytraumatization, or the exposure to multiple ACE, can be operationalised by categorizing individuals based on a pre-defined cutoff number of different ACE they have experienced. For instance, individuals surpassing a specific threshold (e.g., four or more types of ACE) are classified as polytraumatized and are more prone to have poorer mental health (Contractor et al., 2018; Finkelhor et al., 2007).

During adolescence, individuals are particularly vulnerable to the effects of ACE. Studies indicate that adolescents face a higher risk of encountering traumatic events compared to both adults and children (Cisler & Herringa, 2021; Nooner et al., 2012). Most trauma research has focused on adult populations primarily from Western, high-income countries. However, it is important to recognize that most adolescents reside in low- and lower-middle-income countries (LALMIC), including India, which is home to a significant portion of the global under-18 population (United Nations Children’s Fund, n.d.-b). In our study, we specifically targeted this population due to their heightened vulnerability arising from the socio-economic challenges prevalent in their contexts. Compared to developed Western countries, resource allocation in India and Uganda differs substantially due to the prevalence of adversities such as extreme poverty, malnutrition, infectious diseases, and overpopulation (Le et al., 2018).

Exposure to ACE has been linked to various long-term negative outcomes across different domains of human functioning. In terms of mental health, ACE are generally associated with poorer mental health outcomes, specifically Post-Traumatic Stress Disorder (PTSD) and Complex Posttraumatic Stress Disorder (CPTSD) (Frewen et al., 2019). According to the World Health Organization (2022a; 2022b) and its 11th edition of the International Classification of Diseases (ICD-11), both PTSD and CPTSD are classified as distinct stress-related disorders that are considered mutually exclusive. The associations between ACE and PTSD/CPTSD vary based on the methodological approach (Armour & Sleath, 2014; Burns et al., 2016; Kairyte et al., 2022; Karatzias et al., 2020; Young-Wolff et al., 2013). Different types of ACE have distinct associations with PTSD and CPTSD (Brockie et al., 2015; Hyland et al., 2017; Shevlin et al., 2017), while the degree of cumulative exposure to ACE has different impacts on the odds of developing PTSD or CPTSD (Kairyte et al., 2022).

The complexity of the association between ACE and PTSD/CPTSD has led researchers to explore the role of additional factors in explaining the development of trauma-related disorders. Studies have suggested that gender may be a relevant variable, as females tend to exhibit a higher propensity for developing symptoms of PTSD and/or CPTSD compared to males (Asnakew et al., 2019; Ho et al., 2021). Attachment style is another factor that plays a role in the relationship between ACE and symptoms of PTSD/CPTSD. Early experiences in close relationships have a significant impact on an individual's capacity to establish and sustain social connections (Bowlby, 1969). These early attachment experiences influence the development of internal working models, which shape how individuals perceive themselves and others, consequently influencing their future relationships (Bowlby, 1973). Findings from studies investigating trauma exposure, attachment styles, and PTSD and CPTSD, provide evidence supporting the presence of an association connection among these variables.

While many studies focus on either the independent or cumulative effects of ACE exposure on mental health outcomes, limited research examines both concurrently. In this study, we will investigate the independent and cumulative effects of ACE exposure, providing insights into their associations with PTSD and CPTSD diagnoses. Specifically, we aim to gain a deeper understanding of how individual types of ACE may be linked to PTSD/CPTSD and explore the differential impact of these approaches on the development of PTSD and CPTSD, among Indian and Ugandan adolescents. Furthermore, we assess the contributions of sociodemographic variables, including sex and living arrangements, as well as attachment styles, to the likelihood of developing PTSD and CPTSD.

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EMPIRICAL STUDY

Exploring Independent and Cumulative Effects of Adverse Childhood Experiences on PTSD and CPTSD: A Cross-Cultural Study of Indian and Ugandan Adolescents

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Exploring Independent and Cumulative Effects of Adverse Childhood Experiences on PTSD and CPTSD: A Cross-Cultural Study of Indian and Ugandan Adolescents

Background

Adverse Childhood Experiences

Adverse Childhood Experiences (ACE) were first defined as a two-dimensional concept encompassing child abuse and exposure to household dysfunction during childhood. The former was divided into psychological, physical, and sexual abuse, while the latter includes exposure to substance abuse, mental illness, violent treatment of mother or stepmother, and criminal behaviour in the household (Felitti et al., 1998). Currently, ACE are defined as developmental experiences, occurring before age 18, that are not common in normative child development and frequently overwhelm a typical child's regular coping skills (Finkelhor, 2020). These often comprise several types of violence and threat exposure (e.g., physical abuse, sexual abuse, bullying, or criminality), as well as different types of exposure to deprivation and loss (e.g., parental death, absence, or neglect) (Finkelhor, 2020).

Both these definitions diverge in (1) scope, as Felitti's definition focuses on child abuse and exposure to household dysfunction, while the more current definition encompasses a broader range of experiences, including violence, threat exposure, deprivation, and loss, and (2) dimensionality, since one presents ACE as a two-dimensional concept, while the other does not explicitly mention dimensions but rather describes a variety of adverse experiences. Although there is not a universal list of ACE used amongst scholars, most research on ACE and their consequences on mental health, has included exposures to abuse (e.g., sexual), violence (e.g., bullying), neglect (e.g., emotional), and/or loss (e.g., parental death), as operationalizations of the concept (Finkelhor, 2020).

Exposure to ACE is associated with negative mental health outcomes, such as Post-Traumatic Stress Disorder (PTSD) (Brockie et al., 2015; Dyregrov & Yule, 2006). Early and mid-2000s trauma research, specifically on ACE and their relationship with other variables, focused primarily on single trauma-type exposure. For example, a meta-analysis by Paolucci et al. (2001) reported that childhood sexual abuse was associated with poorer mental health outcomes, such as PTSD among others. While these findings were valid and still hold true in more recent research (e.g., Barrera et al., 2013; Dworkin et al., 2017), this approach led to a possible underestimation of the prevalence of the co-occurrence of different types of ACE and their implications, which in turn led scholars to shift their approach and start studying the cumulative nature of trauma exposure.

Finkelhor et al. (2007), showed that the co-occurrence of multiple forms of ACE is more prevalent than exposure to a single ACE in children aged between two and seventeen, labelling the exposure to multiple forms of ACE as poly-victimization. Later, Gustafsson et al. (2009) proposed the broader term polytraumatization defined as "multiple exposures to different traumatic experiences, regardless of source, rather than repetitive incidents or chronic traumas" (p. 275).

The different way in which ACE are conceptualized (i.e., single type vs. cumulative exposure) and their associations with different outcomes, has led researchers in the trauma research field to implement different approaches to the operationalisation of polytraumatization. The following approaches were proposed: cumulative, hierarchical, and categorical.

The hierarchical approach supports the notion that certain specific types of ACE are stronger predictors of negative mental health outcomes. In this approach, different types of ACE are analysed individually to ascertain their independent effects on the development of negative outcomes (e.g., sexual is a stronger predictor for PTSD diagnosis than divorce) (Campbell et al., 2016; Stempel et al., 2017).

The cumulative approach, which is most often used in trauma research, indicates that a dose-response relationship exists between ACE exposure and negative mental health outcomes, i.e., individuals with greater exposure to different types of ACE are more likely to report poorer mental health (Appleyard et al., 2005). A dose-response relationship refers to the association between an amount or intensity of a particular variable (the "dose") and the corresponding effect or response that it produces, throughout this dissertation whenever this type of relationship is mentioned the dose will be referring to the exposure to different types of ACE, whereas the response will be the negative outcome in question.

The categorical approach posits that the exposure to multiple ACE, i.e., polytraumatization, is best operationalized via different classes of exposure that are determined by a pre-designated cut-off number of different ACE the child or adolescent has been exposed to. Specifically, individuals that exceed an exposure threshold (e.g., four or more types of ACE) are considered polytraumatized individuals and are more prone to report poorer mental health (Contractor et al., 2018; Finkelhor et al., 2007). Previous research with either categorical or cumulative approaches used indexes of ACE by summing up the number of events experienced and analysing its cumulative effect on different biopsychosocial outcomes, which supports a dose-response relationship found in previous studies (e.g., Felitti et al., 1998, Finkelhor et al., 2007).

Adolescence and ACE exposure

Adolescence is a particularly sensitive period to exposure to ACE, as research shows that adolescents are at greater risk of experiencing traumatic events than either adults or children (Cisler & Herringa, 2021; Nooner et al., 2012). This phenomenon may be due to biological and psychosocial maturation, as well as an increase in risk-taking behaviours (Janssen et al., 2014). Biological maturation takes place through puberty, which leads to changes in body composition, sexual development, and hormonal changes that, in turn, result in changes in the social status quo of the adolescent (Dahl, 2004). Whereas psychosocial maturation happens through changes in the relationships with parents and peers, attributable to a decrease in time spent with the primary caregivers and an increase in reliance on peers for social support and intimacy (Moretti & Peled, 2004). Another risk factor for ACE exposure during adolescence is the increase in risk-taking behaviours related to sensation-seeking and rewards, in the sense that being among friends in stimulating environments may help suppress rational decision-making in the prefrontal cortex and increase the propensity for risky conduct (Byck et al., 2014). This phenomenon has been dubbed "hot cognition", in which the reward circuits of the adolescent brain take precedence over the analytical regions, increasing the propensity for risk-taking and/or impulsive conduct. Interestingly, adolescents' decisions and knowledge acquired in environments that support cold cognition (e.g., schools) may have little bearing on decisions made in environments that support hot cognition (e.g., parties) as peers and context are significant determinants of how much risk is taken by adolescents (Dahl & Spear, 2004; Nagel, 2019; Whitton et al., 2022).

Low- and lower-middle-income countries

Most adolescents are from and live in low- and lower-middle-income countries (LALMIC), and India has the largest adolescent population in the world (United Nations Children’s Fund, n.d.-b). We decided to conduct the current study with samples from two LALMIC countries, India and Uganda, as they face a greater vulnerability due to the growing socio-economic difficulties of their contexts. Compared with developed Western countries, LALMIC have a higher prevalence of adversities such as extreme poverty, malnutrition, infectious diseases, and overpopulation (Le et al., 2018). Furthermore, most trauma research has been conducted with adult populations from Western countries, i.e., high- and higher-income countries. This hinders the ability to generalise results as exposure to adversity in these settings and populations may differ when compared to younger and culturally different populations, i.e., children and adolescents, from LALMIC.

ACE studies with samples from LALMIC are scarce in comparison with other countries. LALMIC, as defined by The World Bank through institutional, social, environmental, and economic indicators diverge from other countries in general living conditions, accessibility to healthcare, and social contexts due to higher poverty levels and social instability (Le et al., 2018). These differences from Western countries are reflected in prevalence rates of exposure to ACE, notably, when compared with samples from these countries, individuals from LALMIC have higher rates of exposure to ACE (Kidman et al., 2020; Le et al., 2018; Moore & Ramirez, 2015).

The Ugandan context stands out in the account of the use of child soldiers in their armed conflict, child labour and subsequent risks for sexual abuse or human trafficking (Klasen et al., 2010; Renzaho et al., 2017). Uganda has nine million adolescents, totalling 25% of the population. However, numerous are hindered by poverty, HIV/AIDS, early marriage, teenage pregnancy, gender-based violence, and low secondary education participation. Adolescent girls are especially vulnerable. Two-thirds of HIV infections are in adolescent girls. Unwanted teenage pregnancy and early marriage cause many girls to drop out of school. 25% of Ugandan teens become pregnant by 19. Half marry before 18 and have children into their 40s. Adolescent girls frequently have complicated births and abortions that require emergency obstetric care. In Uganda, only 20% of adolescents are in secondary school. Despite school-prohibited corporal punishment, bullying and caning are common occurrences, and school fees and other expenses keep adolescent girls out of school, along with pregnancy and marriage (United Nations Children's Fund, n.d.-a).

Although India did not participate in an armed conflict as recently as Uganda, the country still faces human rights shortcomings, related to some of its social norms. India's complex social landscape reflects regional, gender, caste, and social class disparities. Indian adolescents face a particularly adverse context in which child marriage, caste prejudice, and child labour, are common occurrences. These social norms form a particularly concerning outlook for adolescent girls as they have a higher rate of dropout from school (43%) on account of child marriage, and child labour, among others, when compared to adolescent boys (United Nations Children's Fund, n.d.-c). It is also common for Indian adolescents to face other adversities, such as lack of proper nourishment, limited access to medical and educational services, migration from rural to urban regions (causing urban poverty), and homelessness. These circumstances harm children and make them more vulnerable to abuse and neglect (Kacker et al., 2007; Saraswathi & Oke, 2013).

Two studies examining the prevalence of ACE among Indian youth provide valuable insights into the extent of ACE in different populations. The first study by Damodaran and Paul (2018) involved 600 Indian youth aged 17-24 years, reported that a striking 91% of participants had experienced at least one ACE. Additionally, 52% of the youth in the study reported experiencing three or more ACE, with neglect being the most reported ACE, while physical abuse was the least common. Another study by Arumugam et al. (2022) with a sample of 279 Indian adolescents aged 12-17 years who resided in juvenile correction facilities, found that 86.7% had experienced at least one ACE, while 37.3% of the adolescents had been exposed to three or more ACE.

Prevalence rates of ACE in Uganda suggest a higher risk of exposure to ACE among youth in this context. A study by Kaggwa et al. (2022), conducted with a sample of 316 Ugandan youth aged between 18-22 years, reported that all participants had experienced at least one ACE, while the vast majority (84.5%) were exposed to four or more, with the most common being physical abuse. A different study conducted with 218 mother-child dyads report an average number of ACE reported of five with the most common being living with an adult who used alcohol/drugs and physical abuse (Kim et al., 2023). This study does not distinguish between mother and child prevalence rates, regardless its results indicate a high exposure rate to ACE.

Posttraumatic Stress Disorder and Complex Posttraumatic Stress Disorder

Exposure to ACE is associated with various long-term negative outcomes in different areas of human functioning. Regarding the association between ACE and mental health, overall, ACE are associated with various poorer mental health outcomes, namely PTSD and complex posttraumatic stress disorder (CPTSD) (Frewen et al., 2019). According to the World Health Organization (WHO) and its 11th edition of the International Classification of Diseases (ICD-11) (WHO, 2022), and research evidence (Ben-Ezra et al., 2018; Karatzias et al., 2017; Tian et al., 2020), both PTSD and CPTSD are classified as distinct disorders associated with stress that are considered mutually exclusive.

According to the ICD-11, PTSD may develop following exposure to an extremely threatening or horrific event or series of events (e.g., sexual abuse). It is characterized by three symptom clusters: 1) re-experiencing the traumatic event or events in the present through vivid intrusive memories, flashbacks, or nightmares, which are typically accompanied by strong or overwhelming emotions, particularly fear or horror, as well as strong physiological responses; 2) avoidance of thoughts and memories of the event(s), and/or avoidance of activities, situations, or people reminiscent of the event(s); and 3) persistent perceptions of

heightened current threat, such as hypervigilance or an enhanced startle reaction to stimuli. These symptoms last at least a few weeks and significantly impair the personal, family, social, educational, and occupational areas of functioning (WHO, 2022).

As for CPTSD, the development of this disorder tends to occur after exposure to events of an extremely threatening or horrific nature, typically extended or recurrent occurrences from which escape is difficult or impossible, such as childhood physical or sexual abuse. The diagnosis of CPTSD includes all three PTSD symptom clusters along with three additional clusters that reflect disturbances in self-organization (DSO) as follows: 1) affective dysregulation, including heightened emotional reactivity to mild stressors, violent outbursts, reckless or self-destructive behaviour, stress-induced dissociation, and emotional numbing (e.g., inability to feel pleasure); 2) negative self-concept, through persistent beliefs that one is inferior, defeated, or of no value, accompanied by profound and pervasive feelings of shame, remorse, or failure in relation to the stressor; and 3) disturbances in relationships, namely, difficulties in sustaining relationships and in feeling close to others. Relationships and social engagement, in general, may be consistently avoided, mocked, or held in low regard. Alternately, there may be infrequent intense relationships, but the individual has trouble maintaining them.

Relationship between ACE and PTSD/CPTSD

Although the cumulative approach is the most used approach, and in turn the one that has more data that evidences its rationality, the relative specificity of different types of ACE should be considered when analysing their impacts on mental health outcomes, as the total number of ACE may not adequately explain which ACE are sensitively linked to PTSD and/or CPTSD (Hyland et al., 2017). Some single-type ACE may show connections with both PTSD and CPTSD, whereas others may have associations with just PTSD, just CPTSD, or perhaps no associations at all. To provide a more comprehensive knowledge of the relationship between ACE and PTSD and CPTSD, it is crucial to take both specificity and cumulativeness into account when analysing the effects of ACE.

The associations between ACE and PTSD and/or CPTSD vary according to methodological approach, i.e., whether independent or cumulative effects are analysed. According to several studies that focused on the cumulative effect of ACE, individuals that are considered polytraumatized have considerably higher PTSD symptoms when compared to individuals that had lower levels of exposure or were primarily exposed to single ACE (e.g., sexual abuse) (Armour & Sleath, 2014; Burns et al., 2016; Young-Wolff et al., 2013). Kairyte et al. (2022) reported that the range of reported ACE had different associations with PTSD

and CPTSD, specifically, exposure to less than four ACE was related to a greater risk for PTSD than CPTSD, whereas exposure to six or more ACE translated into higher risk for CPTSD. However, Karatzias et al. (2020) indicated that ACE have only an indirect effect on the development of PTSD and CPTSD symptoms, and this was greater for PTSD symptoms, among adults.

As for the independent effect of ACE, studies show that different types of ACE have distinct associations with both PTSD and CPTSD. However, this association varies between studies. For instance, Brockie et al. (2015) found that being exposed to witnessing violence and physical neglect increased the likelihood of developing PTSD symptoms, compared to sexual abuse and emotional neglect which did not produce a statistically significant association, among adolescents and young adults. Shevlin et al. (2017) reported that sexual abuse had a bigger correlation with PTSD symptoms and DSO, than physical neglect, in an adult population. Hyland et al. (2017) found that both childhood sexual abuse and childhood physical assault significantly increased the risk for CPTSD as compared to PTSD, whereas near drowning was more likely to be associated with PTSD rather than CPTSD, in a sample comprised of young Danish adults.

Several studies with LALMIC samples, similar to those that will be utilised in the current study in terms of context, have sought to examine the relationship between exposure to ACE and diagnosis of PTSD and CPTSD. In India, these have mostly focused on single-type ACE such as traffic accidents (Undavalli et al., 2014), intimate partner violence (Chandra et al., 2009), and natural disasters (Agustini & Matsuo, 2012). However, some studies explored the relationship between ACE and PTSD or, at least, the prevalence of one of them. Studies with samples from other South Asia countries, show a relationship between the number of ACE and PTSD symptoms. Two studies conducted with Nepalese adults (Eide & Dyrstad, 2019) and Sri Lankan children and adolescents (Catani et al., 2008) reported a dose-response association between cumulative exposure to ACE and PTSD. Cumulative ACE exposure was also associated with PTSD in studies with Afghan adolescents and children. Catani et al. (2009) reported a significant positive correlation between the number of ACE and PTSD symptoms, whereas Panter-Brick et al. (2009) reported that exposure to three or more ACE doubled the likelihood of PTSD symptoms and exposure to five or more ACE increased this likelihood threefold.

Studies with samples composed of children and adolescents from Uganda and other East African countries reported prevalence rates for PTSD between 13% and 67.5% (Jonas et al., 2022; Okello et al., 2008), with several studies reporting prevalence rates above 35%

(Ainamani et al., 2022; Bayer et al., 2007; Pfeiffer & Elbert, 2011; Roberts et al., 2008). Regarding the relationship between ACE exposure and PTSD, studies conducted with samples from these countries show similar results to those from the South Asian countries mentioned above. Pfeiffer and Elbert (2011) conducted a study employing a cumulative approach with formerly abducted young Ugandan adults, reporting a positive correlation between the total number of ACE and PTSD scores, whereas another study it was reported a dose-response relationship in which when compared to individuals who were exposed to 0-3 ACE, individuals exposed to 4-7 events were two and a half times more likely to develop PTSD, while individuals exposed to 8-11 and 12-16 events had a greater likelihood by four and a half and six and a half times, respectively, within an adult sample (Roberts et al., 2008). A study conducted with a sample of child and adolescent girls from the Democratic Republic of Congo, also observed a dose-response relationship in which the probability of having a PTSD diagnosis increased gradually with the increase of ACE exposure, while also reporting that single-type events as abuse with a weapon and rape with penetration considerably increased the probability of PTSD with odds ratios of 4.34 and 4.73 (Jonas et al., 2022).

Sex, Living Arrangements, Attachment, and their associations with PTSD/CPTSD

The complex association between ACE exposure and psychological disorders, coupled with discrepancies in research findings, has prompted researchers to consider the involvement of other variables in explaining the development of trauma-related disorders. As not every individual who has experienced exposure to multiple ACE develops PTSD or CPTSD, this indicates the presence of additional factors influencing the relationship between ACE and these conditions.

One of these proposed variables is the sex of the person, as the likelihood of having PTSD and/or CPTSD symptoms is higher for females when compared to males (Asnakew et al., 2019; Ho et al., 2021). This difference is also present in the exposure to specific trauma types, as females are more likely to be exposed to childhood sexual abuse (Alisic et al., 2014; Clarke et al., 2016; Ho et al., 2021). In turn, exposure to certain ACE such as child sexual abuse can be exacerbated by factors such as the family structure in which the child or adolescent is inserted. Specifically, a study on sexual abuse and familial factors as predictors of PTSD by Bernard-Bonnin et al. (2008), found that a larger proportion (53.7%) of sexually abused girls came from single-parent families.

Another variable associated to the relationship between ACE and PTSD/CPTSD symptoms is attachment style. Attachment theory proposes that early experiences in close relationships shape an individual's ability to form and maintain social connections throughout

life (Bowlby, 1969). According to this theory, humans have an innate drive to seek proximity and comfort from attachment figures, particularly in times of distress or threat (Ainsworth et al., 1978). The quality of these early attachment experiences sets the stage for the development of internal working models of self and others that shape future relationships (Bowlby, 1973).

The Model of Functioning and Dynamics of the Attachment System is an extension of attachment theory that seeks to provide a more nuanced understanding of how the attachment system operates in different contexts and how it interacts with other psychological processes (Mikulincer & Shaver, 2007). According to this model, each person develops internal working models based on their early attachment experiences. These internal working models consist of mental frameworks or schemas that shape individuals' expectations, perceptions, and behaviours towards attachment figures and close relationships. These models are formed through a process of assimilating and organizing attachment-related information and serve as templates for understanding and navigating social interactions throughout the lifespan of a person.

Internal working models include beliefs about oneself (e.g., self-worth, lovability) and others (e.g., trustworthiness, availability), and can influence emotional experiences, relational patterns, and coping strategies in relationships. These models can have a profound impact on individuals' attachment-related behaviours and the quality of their future relationships. This model proposes that the attachment system can be activated by a wide range of stimuli, not just physical separation, or danger. For example, it may be triggered by social exclusion, rejection, or interpersonal conflict. When the attachment system is activated, it influences cognitive, emotional, and behavioural responses to restore a sense of security (Mikulincer & Shaver, 2012).

Mikulincer and Shaver (2007) describe two primary strategies that individuals may use to regulate attachment-related distress: anxious and avoidant attachment. Anxious attachment tends to hyperactivate the attachment system in response to perceived threats or rejection, leading to a preoccupation with attachment-related concerns, heightened vigilance, and seeking proximity and reassurance from attachment figures. Avoidant attachment, in contrast, tends to deactivate the attachment system by minimizing the importance of close relationships, avoiding emotional intimacy, and emphasizing self-reliance and independence.

Both anxious and avoidant strategies can have adaptive or maladaptive consequences, depending on the context. Individuals with higher levels of anxious attachment may be more likely to seek social support and engage in affiliative behaviour, promoting social bonding

and reducing stress. However, excessive reliance on attachment figures or fear of rejection can also lead to relationship conflict and emotional dysregulation. Higher levels of avoidant attachment may lead to better emotional regulation and fewer relationship conflicts but may cause a person to miss out on the benefits of close relationships and experience feelings of loneliness or detachment (Shaver et al., 2016).

This model conceptualizes attachment styles as patterns of thoughts, emotions, and behaviours that individuals use to regulate attachment-related anxiety and avoidance in close relationships (Shaver et al., 2016). Within this model, there are several distinct attachment styles, each with its own set of characteristics. These include secure attachment, dismissive attachment, preoccupied attachment, and fearful attachment.

Individuals with secure attachment, are characterized by having low levels of anxious and avoidant attachment strategies. They tend to be comfortable with intimacy and seek emotional closeness with others. They feel secure in their relationships and have a positive view of themselves and others. They regulate their emotions more effectively and use adaptive coping strategies in times of stress. Individuals with preoccupied attachment style, have higher levels of anxiety attachment but low levels of avoidant attachment, and exhibit a concern with the availability and responsiveness of their attachment figures. They have a high level of attachment-related anxiety and are hypersensitive to cues of rejection or abandonment. They tend to rely on others for validation and reassurance and may use maladaptive strategies, such as emotional outbursts or clinginess, to maintain closeness. Individuals that have a dismissive attachment style demonstrate high levels of both anxious and avoidant attachment and may view intimacy as a threat to their independence. They tend to suppress their emotions and reject seeking support from others, even in times of distress. They may use avoidant strategies, such as distancing or minimizing the importance of close relationships, to maintain emotional distance. Individuals that have inconsistent and often contradictory behaviours in close relationships are described as having a fearful attachment style. They may exhibit anxious and avoidant behaviours, dissociative states, or other disordered behaviours. Individuals with this attachment style are relatively restrained and unassertive and usually have a history of childhood abuse as well as other attachment-related traumas (Shaver et al., 2016).

Research on trauma exposure, attachment styles, and mental health outcomes, namely PTSD and CPTSD, has produced results that corroborate the existence of a relationship between these variables. A meta-analysis by Woodhouse et al. (2015), conducted with studies that assessed the relation between attachment and PTSD symptoms in adults, reported

associations between the four attachment styles and PTSD, namely positive correlations were reported between anxious and fearful attachment styles and PTSD symptoms, although the effect of the fearful attachment style was stronger, secure attachment was negatively associated with PTSD symptoms, and dismissive attachment had a non-statistically significant positive correlation with PTSD symptoms. This may be explained by the fact that individuals with a dismissive attachment are less likely to report distress as opposed to individuals with an anxious attachment (Mikulincer et al., 2003; Mikulincer & Shaver, 2007).

The study of types of traumatic events and their different impact on the relationship between attachment and PTSD is corroborated by the findings of a systematic review by Barazzone et al. (2018), which reported that interpersonal trauma (i.e., trauma involving a victim and a perpetrator) had a greater association with insecure attachments than non-interpersonal trauma. In a study that assessed the association between the four attachment styles and the severity of CPTSD symptoms, Karatzias et al. (2021) found that secure and fearful attachments were, respectively, negatively, and positively associated with CPTSD symptoms but not with PTSD symptoms, among an adult population. A dismissive attachment was positively associated with both PTSD and CPTSD, and a preoccupied attachment was not associated with either PTSD or CPTSD. Although there is very little research focused on attachment and mental health outcomes with Ugandan and Indian samples, studies have shown secure parental attachment to be a protective factor against the development of anxiety and depression symptoms in Ugandan adolescents (Okello et al., 2014; Okello et al., 2015), while having fearful attachment style was linked to higher levels of trauma-related symptoms in Indian adults (Suar et al., 2017).

Purpose of the Study

Most studies employ analysis to determine either the independent or cumulative effect of ACE exposure and mental health outcomes, but only a few studies analyse both concurrently in the same study. Taking into consideration the discrepancies of the current literature that reports contradictory results (e.g., Brockie et al., 2015; Shevlin et al., 2017), in the present study, we will: analyse the independent and cumulative effects of ACE exposure to better understand how these are associated with PTSD and CPTSD diagnosis; provide additional knowledge regarding how differently single-type ACE may be associated with PTSD/CPTSD; understand the differential effect of both approaches on the development of PTSD or CPTSD in adolescents from India and Uganda. Certain forms of ACE may exhibit correlations with both PTSD and CPTSD, while others may be linked to only one of these conditions or none. Hence, it is imperative to consider the aspects of specificity and

cumulativeness while scrutinising the effects of ACE on the development of trauma-related disorders, to furnish a more complete understanding of the associations between ACE, attachment, PTSD, and CPTSD in adolescents. Considerable ambiguity persists regarding the association between ACE and the co-occurring diagnoses of PTSD and CPTSD in the adolescent population. Most prior research has examined ACE exposure utilising either an independent or cumulative effect. By considering both the independent and cumulative effects of ACE, our study seeks to contribute to the knowledge of the relationship between ACE and the likelihood of developing PTSD/CPTSD. Additionally, we aim to analyse how sociodemographic variables such as sex and living arrangements, as well as attachment, contribute to the odds of developing these disorders.

Furthermore, we will conduct these analyses using samples consisting of adolescents living in two LALMIC, with the aim of mitigating the scarcity of studies conducted in these contexts and age group. The overarching goal of this study is to build upon and extend the existing literature by investigating the relationship between ACE and PTSD, CPTSD, among adolescents in India and Uganda. The current investigation specifically aimed to (1) identify the prevalence of ACE, PTSD, CPTSD, and attachment styles; (2) examine the independent effects of each ACE on PTSD and CPTSD diagnosis, (3) examine the cumulative effect of ACE exposure on PTSD and CPTSD, and (4) verify the effect of attachment style, sex, and living arrangements on the aforementioned relationships.

Method

Participants

Two samples of 401 Ugandan and 411 Indian schoolchildren participated in this study. Sample characteristics are presented in Table 1. The mean age of the Ugandan sample was almost 16 years old and aged 13 to 19; the mean age of the Indian sample was around 14 years old and aged 13 to 16. In the Ugandan sample, the proportion of females was higher compared with males, whereas in the Indian sample, the opposite was true. Most of the Indian participants lived with both parents, while the Ugandan adolescent had a more even distribution among the three types of living arrangements.

Table 1

Sample Demographic Characteristics

	Ugandan group (n= 401)	Indian group (n = 411)
Age		

13 years	7 (1.7%)	17 (4.1%)
14 years	50 (12.5%)	316 (76.9%)
15 years	89 (22.2%)	77 (18.7%)
16 years	139 (34.7%)	1 (0.2%)
17 years	81 (20.2%)	-
18 years	27 (6.7%)	-
19 years	8 (2.0%)	-
Mean	15.9 (SD=1.2)	14.2 (SD =0.5)
Sex		
Male	198 (49.4%)	219 (53.3%)
Female	203 (50.6%)	192 (46.7%)
Living with		
Both parents	170 (42.4%)	395 (96.1%)
One of their parents	142 (35.4%)	13 (3.2%)
Other arrangements (uncles, siblings, grandparents or other relatives)	89 (22.2%)	3 (0.7%)

Procedure

The primary aim of this study was to gather information on exposure to ACE and its psychological consequences, namely PTSD and CPTSD, for adolescents living in different countries. Uganda and India were selected because they are two LALMIC in which adolescents have a high risk of being exposed to different types of ACE. However, both countries differ in their societal context. Uganda is a large, East African country that has experienced social unrest and civil war. India is a large and overpopulated South Asian country characterized by disadvantaged living circumstances (e.g., severe poverty, terrorist attacks, riots, and natural disasters).

Eight boarding schools, three in Kampala, three in Mbarara and two in Jinja were selected in Uganda. The Institutional Review Board of the Ugandan National Council for Science and Technology reviewed and approved the research protocol. Following, the aim of the study and the confidentiality principles were explained to the headmasters of the selected schools. It was applied passive consent which is a usual procedure in most school studies in LALMIC, i.e., the parents were informed

about the study and have the right to refuse the participation of their child. Before beginning the study, it was conducted a pilot study where the students completed the questionnaires in the classroom. The questionnaires were in English which is the official language of the country and the school system in Uganda.

A short introduction was given before handing out the questionnaires to the participants, explaining the objective of the study, the option of not participating, the confidentiality principles and the procedure of collecting the questionnaire in one envelope and sealing it in front of the students. An average of 15-20 minutes was spent on introduction and explanation before the participants were asked to fill out the questionnaires. Participants spent approximately one and a half hours filling out the questionnaires. The researcher requested that the headmaster of all schools would spare one or more teachers for each class to assist in answering and explaining the questions that the researcher was not able to and indeed the teachers were very helpful with this. The students were given pens and calculators as an appreciation for their help.

Regarding the Indian sample, participants were from the city of Pune in the state of Maharashtra. Data collection was only conducted in Pune and only students from private schools were selected for the study due to limited resources such as time and finances. Five schools were selected on a convenience basis and invitations to participate in the study were sent, but only two accepted to collaborate in the study. The research protocol was reviewed and approved by the headmasters and the boards of the schools. It was applied passive consent which is a usual procedure in most school studies in LALMIC, i.e., the parents were informed about the study and have the right to refuse the participation of their child. Participants were mainly from middle- and upper-class backgrounds. Each of the eight classes of students who participated in the study consisted of 50 to 60 adolescents.

A pilot study was conducted with seven respondents aged 13-14 years. Participants were introduced to information about the study aims, procedures and the role of the participant, verbally and by letter. The participation was voluntary and informed consent was given directly by the participants who accepted to participate in the study. Participants filled out the questionnaires in the classroom, supervised by a team researcher in co-operation with two Hindi-speaking Indian psychology students, who explained the research protocol and practicalities in answering the questionnaire. The students were informed that their answers were anonymous and asked to answer as openly as possible. All students present accepted to participate in the study.

Measures

The first part of the questionnaire package contained questions concerning sociodemographic data. Specifically, participants provided information on their sex, age, and current living arrangements.

The second part of the questionnaire contained 20 items about ACE, participants were asked if they had been exposed directly to a list of 20 life-threatening experiences (e.g., rape) and stressful family conditions (e.g., neglect). The measure was developed by Bödvarsdóttir and Elklit (2007) who selected the list of events from scientific literature and clinical experience. This measure has been widely applied cross-culturally (e.g., Ferrajão & Elklit, 2021). Because of the similarity of some events, a list of 15 grouped traumas was compiled and analysed in the current study (Ferrajão et al., 2022).

The third part of the questionnaire assessed attachment, and PTSD and CPTSD symptoms. The Revised Adult Attachment Scale (RAAS; Collins & Read, 1990) was used to assess participants' attachment orientations. This self-report measure includes 18 items in which all the responses are scored on a 5-point Likert scale (from "not at all characteristic of me" = 1 to "very characteristic of me" = 5). The scale covers three dimensions: (a) six items on closeness attachment (e.g., I find it relatively easy to get close to people); (b) six items on dependency attachment (e.g., I am comfortable depending on others) and (c) six items comprised the anxious attachment dimension (e.g., I often worry that romantic partners don't really love me). The sum of items in the anxious dimension was used as the index score of attachment anxiety orientation. The mean of index scores of both closeness and dependency dimensions was used as the index score of attachment avoidance orientation. The RAAS is a widely used measure for attachment dimensions and attachment styles among adolescents. It has been used in previous studies on samples of African adolescents (Ferrajão & Elklit, 2021). The categorical attachment styles were grouped by combining the high and low values on the dimensions of anxiety and avoidance, with a high score as being above the midpoint on a five-point scale, and a low score as below the midpoint. Secure attached scores low on the anxiety dimension and low on the avoidance dimension; preoccupied attached scores high on the anxiety dimension and low on the avoidance dimension; dismissing attached scores low on the anxiety dimension and high on the avoidance dimension; fearful attached scores high on the anxiety dimension and high on the avoidance dimension. High is defined as being above the midpoint on the 5-point scale, and low as below the midpoint. Cronbach alpha for the attachment anxiety

scale was .78 in the combined sample (Ugandan =.76; Indian =.81) and the attachment avoidance scale was .80 in the combined sample (Ugandan =.76; Indian =.84).

PTSD symptoms were assessed through an item set. According to Elklit et al. (2014), six items were selected from the Harvard Trauma Questionnaire: Part IV (HTQ-IV: Mollica et al., 1992) to assess PTSD symptoms, answered on a 4-point Likert scale (from "not present" = 1, to "very often present" = 4). The items representing PTSD symptoms are shown in Table 2. PTSD diagnosis was performed using ICD-11 criteria. A diagnosis of PTSD requires the endorsement of one of two symptoms from the symptom clusters of (1) re-experiencing in the here and now, (2) avoidance, and (3) sense of current threat, plus the endorsement of at least one indicator of functional impairment associated with these symptoms. Endorsement of a symptom or functional impairment item is defined as a score equal to or higher than 2. Cronbach alpha of the item set was .84 in the combined sample (Ugandan =.78; Indian =.86).

CPTSD symptoms were assessed through an item set. Six items were selected from two standardized measures, the HTQ-IV (Mollica et al., 1992), and the Trauma Symptom Checklist (TSC; Briere & Runtz, 1989) to assess CPTSD symptoms. The items are answered with reference to the previous month that are answered on a 4-point Likert scale (from "never" = 0, to "very often" = 3). According to Elklit et al. (2014), five items from the TSC and one item from the HTQ-IV were used in the CPTSD item set to assess the CPTSD clusters (affective dysregulation, negative self-concept, and disturbances in relationships). The items representing PTSD and CPTSD are shown in Table 2. A diagnosis of CPTSD requires the endorsement of one of two symptoms from each of the three PTSD symptoms clusters (re-experiencing in the here and now, avoidance, and sense of current threat) and one of two symptoms from each of the three Disturbances in Self-Organization (DSO) clusters: (1) affective dysregulation, (2) negative self-concept, and (3) disturbances in relationships. Functional impairment must be identified where at least one indicator of functional impairment is endorsed related to the PTSD symptoms and one indicator of functional impairment is endorsed related to the DSO symptoms. Endorsement of a symptom or functional impairment item is defined as a score equal to or higher than 2. Cronbach alpha of the item set was .81 in the combined sample (Ugandan =.79; Indian =.83).

Table 2

Items representing PTSD symptoms and Complex PTSD

Cluster	Test items
PTSD symptoms	HTQ 2. Feeling as though the event is happening again

	HTQ 3. Recurrent nightmares
	HTQ 6. Being jumpy or easily startled
	HTQ 9. Feeling on guard
	HTQ 11. Avoiding activities that remind you of the traumatic or hurtful event
	HTQ 15. Avoiding thought or feelings associated with the traumatic or hurtful events
Affect dysregulation	TSC 16. Temper outburst that you could not control
	TSC 14. Crying easily
Negative self-concept	TSC 28. Feelings of inferiority or insecurity
	TSC 29. Blaming yourself
Interpersonal problems	TSC 6. Feeling isolated from other people
	HTQ 27. Feeling that you have no one to rely upon

Analytic strategy

Multiple set analyses were conducted. Descriptive analyses were performed to present sample characteristics. Firstly, statistically significant differences in age, living arrangements, and rates of ACE exposure between the Indian and Ugandan samples prevented multinomial logistic regressions from being performed on a combined sample. Next, the two subgroups (Ugandan and Indian samples) were analysed separately. The prevalence of ACE was analysed for each subgroup. For a preliminary analysis, a series of Chi-square tests were performed to compare both countries' subgroups with sociodemographic variables and study variables (i.e., sex, age, highest level of parental education and current living arrangements, adverse childhood experiences, attachment style, PTSD diagnosis, and CPTSD diagnosis).

Subsequently, two multinomial logistic regression analyses were performed to address the research questions, independent and cumulative impacts of ACE on the current conditions of PTSD and CPTSD diagnosis. A multinomial logistic regression model is useful when examining the effects of independent variables on a nominal dependent variable, here, diagnostic criteria, or not, for PTSD and/or CPTSD. Given that multinomial logistic regression requires a minimum of 10 cases per independent variable (Schwab, 2002), the sample size of both subgroups in the present study was large enough to conduct multinomial logistic regression. The Nagelkerke R^2

(Nagelkerke, 1991) was chosen to obtain the R^2 in multinomial logistic regression, because it adjusts the Cox-Snell R^2 (Cox & Snell, 1989) by dividing Cox-Snell R^2 by its upper bound, for a more intuitive interpretation of R^2, such as R^2 in the linear regression model.

The first multinomial logistic regression model included single ACE items, gender (female or not), living arrangements (child lives with both parents or not), secure attached (yes or no), preoccupied attached (yes or no), dismissing attached (yes or no), and fearful attached (yes or no) as independent variables, and PTSD as the dependent variable. The second regression model had a cumulative index of ACE (i.e., categories of ACE), instead of individual ACE items, and the remaining independent variables that were included in the first regression model, with CPTSD as the dependent variable. The odds ratios indicate the expected increase/decrease in the likelihood of scoring positively on the given dependent variable compared with the reference, or control group.

Results

Sociodemographic variables

There were statistically significant differences in age between Ugandan and Indian adolescents (t (880) = 26.48, $p < .001$). The mean age was higher in Ugandan participants (M = 15.9; SD = 1.2; 95% IC: 15.8–16.0) compared to Indian participants (M = 14.2; SD = 0.5; 95% IC: 14.1–14.2). Chi-square analyses were conducted to analyse the associations between group memberships of both countries and sociodemographic characteristics, such as sex and living arrangements. There was no significant association between sex and country membership (χ^2 (1, n = 812) = .58, p = .45). Chi-square test indicated a significant association between people with whom they live and country (χ^2 (2, n = 812) = 277.27, $p < .001$). The proportion of adolescents who lived with both parents in the Ugandan sample was lower compared with the Indian sample.

Prevalence of adverse childhood experiences

As can be seen in Table 3, in the Ugandan sample, the most common event was death of someone close, followed by physical violence, bullying and threats of violence, and serious illness, which were reported by more than half of the participants. Least prevalent was pregnancy/abortion, followed by attempted suicide and sexual abuse. In the Indian sample, the most reported event was serious accidents, followed by death of someone close and serious illness. The least reported event was attempted suicide, followed by sexual abuse and pregnancy/abortion. A series of Chi-square analyses were conducted to demonstrate the associations between group memberships of both countries and prevalence of ACE. It was found that there were significant Chi-square statistics between subgroups of both countries in

all variables except for exposure to serious accidents in which there were no significant Chi-square statistics between both countries. Specifically, the proportion of exposure to ACE was higher in the Ugandan sample in all variables, except for exposure to traffic accidents, which had a higher proportion in the Indian sample.

Table 3

Chi-Square Analyses between group membership and exposure to ACE

	Ugandan (n=411) Count (%)	India (n=401) Count (%)	$\chi 2$
Event			
Serious accidents	196 (48.9%)	192 (46.7%)	0.38
Physical violence	271 (67.6%)	49 (11.9%)	263.33***
Sexual abuse	76 (19.0%)	13 (3.2%)	51.85***
Witnessed other people injured or killed	177 (44.1%)	76 (18.5%)	62.25***
Came close to being injured or killed	186 (46.4%)	75 (18.2%)	73.67***
Bullying and threats of violence	271 (67.6%)	74 (18.0%)	204.15***
Near-drowning	124 (30.9%)	35 (8.5%)	64.71***
Attempted suicide	72 (18.0%)	10 (2.4%)	53.86***
Robbery/theft	176 (43.9%)	45 (10.9%)	111.19***
Pregnancy /abortion	26 (6.5%)	14 (3.4%)	4.10*
Serious illness	265 (66.1%)	113 (27.5%)	121.49***
Death of someone close	306 (76.3%)	170 (41.4%)	102.19***
Divorce	107 (26.7%)	10 (2.4%)	96.78***
Childhood neglect	103 (25.7%)	18 (4.4%)	72.66***
Absence of a parent	182 (45.4%)	34 (8.3%)	143.19***

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

Attachment styles, and PTSD and CPTSD diagnosis

A series of Chi-square analyses were conducted to demonstrate the associations between group memberships of both countries and prevalence of the categorical attachment styles. It was found that there were significant Chi-square statistics between subgroups of both countries in secure, preoccupied, and fearful attachment styles, but there were no significant Chi-square statistics between subgroups of both countries in the dismissing attachment style. Specifically, the proportion of participants with a secure attachment style was higher in the Indian sample, and the proportion of participants with both preoccupied and fearful attachment styles was higher in the Ugandan sample (Table 4).

Table 4

Chi-Square Analyses between group membership and attachment style, and PTSD and CPTSD diagnosis

	Ugandan (n=411) Count (%)	India (n=401) Count (%)	$\chi 2$
Attachment style			
Secure	135 (33.7%)	227 (55.2%)	38.21***
Preoccupied	121 (30.2%)	51 (12.4%)	38.37***
Dismissing	59 (14.7%)	79 (19.2%)	2.92
Fearful	86 (21.4%)	54 (13.1%)	9.82**
Diagnosis			
PTSD	356 (63.8%)	163 (39.7%)	47.52***
CPTSD	145 (36.2%)	74 (18.0%)	33.96***

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

A series of Chi-square analyses were conducted to demonstrate the associations between group memberships of both countries and the prevalence of both PTSD and CPTSD diagnoses. As can be seen in Table 4, there were significant Chi-square statistics between subgroups of both countries in both disorders' diagnoses. It was found that the proportion of participants diagnosed with PTSD or CPTSD was higher in the Ugandan sample.

Independent and cumulative effects of ACE on PTSD Diagnosis

The first multinomial logistic regression model was implemented to examine the relationship between independent ACE and PTSD diagnosis. Table 5 presents the odd ratios and Confidence Intervals associated with each predictor. Sex was the only sociodemographic characteristic that was significantly associated with PTSD diagnosis, but only in the Ugandan sample. Females are twice as likely to have a diagnosis of PTSD in the Ugandan sample. Regarding the categorical attachment styles, only fearful attachment style was significantly

associated with PTSD diagnosis in both samples. Ugandan adolescents with a fearful attachment style were three and a half times more likely of having a PTSD diagnosis, while Indian adolescents with fearful attachment were two and a half times more likely of having a PTSD diagnosis. It was also observed that not having a secure attachment or having a preoccupied attachment style was associated with twice the risk of a PTSD diagnosis in the Indian sample.

The subgroups of Ugandan and Indian adolescents were found to have heterogeneous associations between independent ACE and PTSD diagnosis. In the Ugandan sample, exposure to physical violence, witnessing other people injured or killed, and attempted suicide were significantly associated with PTSD diagnosis. While participants exposed to the latter two experiences were nearly two and a half times more likely to have a PTSD diagnosis, participants exposed to the former were twice as likely to have a PTSD diagnosis. In the Indian sample, only bullying and threats of violence, and the death of someone close were significantly associated with PTSD diagnosis. The former increased nearly two and a half times the likelihood of PTSD diagnosis, and the latter increased nearly two times the likelihood of PTSD diagnosis.

Table 5

Results of the Multinomial Logistic Regression for PTSD: Independent ACE

	Ugandan		Indian	
	Odds ratio	CI interval	Odds ratio	CI interval
Sex (female)	2.14***	(1.34, 3.40)	1.18	(0.74, 1.87)
Living arrangements (One parent or other arrangements)	1.15	(0.93, 2.52)	0.92	(0.27, 3.14)
Secure (No)	0.80	(0.41, 1.58)	2.12**	(1.36, 3.35)
Preoccupied	0.69	(0.34, 1.39)	2.23*	(1.15, 4.34)
Dismissing	1.74	(0.98, ~3.03)	0.62	(0.34, 1.12)
Fearful	3.43**	(1.56, 7.58)	2.42**	(1.26, 4.65)
Serious accidents	0.83	(0.52, 1.33)	1.31	(0.81, 2.13)
Physical violence	2.13**	(1.27, 3.58)	1.60	(0.78, 3.32)

Sexual abuse	1.58	(0.82, 3.07)	0.64	(0.11, 2.67)
Witnessed other people injured or killed	2.31***	(1.40, 3.80)	1.06	(0.64, 1.76)
Came close to being injured or killed	1.00	(0.63, 1.63)	0.98	(0.53, 1.83)
Bullying and threats of violence	1.06	(0.62, 1.80)	2.37**	(1.30, 4.33)
Near-drowning	1.26	(0.74, 2.14)	1.99	(0.91, 4.36)
Attempted suicide	2.42*	(1.21, 4.86)	1.51	(0.28, 8.01)
Robbery/theft	1.02	(0.63, 1.63)	1.18	(0.56, 2.49)
Pregnancy /abortion	0.46	(0.17, 1.25)	0.57	(0.15, 2.10)
Serious illness	1.07	(0.65, 1.78)	1.81*	(1.04, 2.81)
Death of someone close	1.25	(0.74, 2.14)	0.99	(0.63, 1.57)
Divorce	1.24	(0.68, 2.24)	1.10	(0.21, 5.76)
Childhood neglect	0.92	(0.50, 1.68)	1.83	(0.50, 6.76)
Absence of a parent	0.82	(0.48, 1.39)	0.82	(0.35, 1.93)

Notes: Reference group = None, n = 19,179. Nagelkerke $R^2 = 0.24$.

* p < .05, **p < .01, ***p < .001.

The second multinomial logistic regression model was implemented to examine the relationship between cumulative exposure to ACE and PTSD diagnosis. Table 6 presents the odd ratios and Confidence Intervals associated with each predictor. Likewise, sex was the only sociodemographic characteristic that was significantly associated with PTSD diagnosis, only in the Ugandan sample, presenting the same probability that was found in the multinomial logistic regression model for the independent ACE. Regarding the categorical attachment styles, fearful attachment style was significantly associated with PTSD diagnosis, with the same probabilities of having a PTSD diagnosis in both samples that were observed in the first implemented first multinomial logistic regression model. In the Indian sample, it was found that not having a secure attachment increased almost twofold the likelihood of having a PTSD diagnosis.

There was some heterogeneity between both subgroups on the association between cumulative exposure to ACE and PTSD diagnosis. In the Indian sample, exposure to one ACE and exposure to 2-3 ACE were significantly associated with PTSD diagnosis. Adolescents exposed to one ACE were almost seven times more likely to have a PTSD diagnosis, and adolescents exposed to 2-3 ACE were twice as likely to have a diagnosis of PTSD. In the Ugandan sample, exposure to 2-3 ACE and exposure to 4-5 ACE were significantly associated with PTSD diagnosis. Ugandan adolescents exposed to 2-3 ACE were almost nine times more likely of presenting a PTSD diagnosis, and adolescents exposed to 4-5 ACE were twice as likely to have a diagnosis of PTSD.

Table 6

Results of the Multinomial Logistic Regression for PTSD: Cumulative ACE

	Ugandan		Indian	
	Odds ratio	CI interval	Odds ratio	CI interval
Sex (female)	2.04**	(1.32, 3.15)	1.19	(0.77, 1.85)
Living arrangements (One parent or other arrangements)	1.42	(0.91, 2.21)	0.92	(0.31, 2.72)
Secure (No)	0.82	(0.43, 1.55)	1.78**	(1.20, 2.66)
Preoccupied	0.65	(0.33, 1.26)	1.83	(0.96, 3.46)
Dismissing	1.69	(0.96, 3.00)	1.34	(0.77, 2.32)
Fearful	3.35**	(1.56, 7.19)	2.57**	(1.35, 4.86)
ACE (1)	3.73	(0.76, 18.29)	6.77***	(2.90, 15.77)
ACE (2-3)	8.78**	(2.12, 36.42)	2.25*	(1.04, 4.84)
ACE (4-5)	2.27*	(1.17, 4.41)	1.86	(0.90, 3.82)
ACE ($\geq$ 6)	1.38	(0.79, 2.42)	1.74	(0.78, 3.89)

Notes: Reference group = None, n = 19,179. Nagelkerke R^2 = 0.24.

* p < .05, **p < .01, ***p < .00

Independent and cumulative effects of ACE on CPTSD diagnosis

First, a multinomial logistic regression model was implemented to examine the relationship between independent ACE and CPTSD diagnosis. Table 7 presents the odd ratios and Confidence Intervals associated with each predictor. None of the sociodemographic variables included in the model were associated with CPTSD diagnosis. There were some differences between both subgroups in the association between the categorical attachment styles and CPTSD diagnosis. In the Ugandan sample, only dismissing attachment style was significantly associated with CPTSD diagnosis. Adolescents with a dismissing attachment style were twice as likely to have a CPTSD diagnosis. In the Indian sample, both preoccupied and fearful attachment styles, and not having a secure attachment were significantly associated with CPTSD diagnosis. Not having a secure attachment style increased three times the risk of having a CPTSD diagnosis; adolescents with a preoccupied attachment style were almost four times more likely of presenting a CPTSD diagnosis; and adolescents with a fearful attachment style were five and a half times more likely of presenting a CPTSD diagnosis.

It was observed some heterogeneity between both subgroups on the association between independent exposure to ACE and CPTSD diagnosis. In the Indian sample, both exposure to physical violence, and bullying and threats of violence were significantly associated with CPTSD diagnosis. Adolescents exposed to physical violence had twice the probability of having a CPTSD diagnosis, and adolescents exposed to bullying and threats of violence were two and a half times more likely to have a CPTSD diagnosis. In the Ugandan sample, exposure to sexual abuse, bullying and threats of violence, and near-drowning were significantly associated with CPTSD diagnosis. Exposure to these ACE increased the risk of having a CPTSD diagnosis twofold.

Table 7

Results of the Multinomial Logistic Regression for CPTSD: Independent ACE

	Ugandan		Indian	
	Odds ratio	CI interval	Odds ratio	CI interval
Sex (female)	1.38	(0.90, 2.14)	0.95	(0.56, 1.59)
Living arrangements (One parent or other arrangements)	1.11	(0.69, 1.80)	2.13	(0.61, 7.45)
Secure (No)	1.39	(0.89, 2.17)	3.05***	(1.89, 4.92)

Preoccupied	1.10	(0.64, 1.89)	3.88***	(1.93, 7.83)
Dismissing	2.11*	(1.08, 4.14)	1.71	(0.91, 3.24)
Fearful	1.37	(0.76, 2.48)	5.46***	(2.75, 10.87)
Serious accidents	0.74	(0.47, 1.16)	1.15	(0.67, 1.99)
Physical violence	1.59	(0.96, 2.62)	2.20*	(1.04, 4.66)
Sexual abuse	1.93*	(1.05, 3.53)	2.90	(0.44, 18.96)
Witnessed other people injured or killed	1.01	(0.64, 1.60)	0.66	(0.34, 1.29)
Came close to being injured or killed	1.20	(0.77, 1.86)	1.20	(0.62, 2.34)
Bullying and threats of violence	1.90*	(1.15, 3.14)	2.62**	(1.39, 4.91)
Near-drowning	1.83*	(1.13, 2.98)	1.47	(0.66, 3.31)
Attempted suicide	1.62	(0.90, 2.90)	1.43	(0.26, 7.99)
Robbery/theft	1.07	(0.69, 1.67)	0.90	(0.40, 2.04)
Pregnancy /abortion	0.46	(0.18, 1.18)	0.89	(0.23, 3.47)
Serious illness	1.27	(0.78, 2.07)	1.26	(0.70, 2.26)
Death of someone close	0.71	(0.42, 1.21)	0.85	(0.51, 1.41)
Divorce	1.13	(0.65, 1.94)	0.81	(0.15, 4.45)
Childhood neglect	1.15	(0.87, 2.59)	0.74	(0.18, 3.08)
Absence of a parent	1.21	(0.74, 1.98)	0.88	(0.35, 2.20)

Notes: Reference group = None, n = 19,179. Nagelkerke $R^2 = 0.24$.

* p < .05, **p < .01, ***p < .00

Finally, a multinomial logistic regression model was implemented to examine the relationship between cumulative exposure to ACE and CPTSD diagnosis. Table 8 presents the odd ratios and Confidence Intervals associated with each predictor. None of the sociodemographic variables were associated with CPTSD diagnosis. The four

categorical attachment styles were significantly associated with CPTSD diagnosis only in the Indian sample. Adolescents with a dismissing attachment style were twice as likely to have a CPTSD diagnosis; a preoccupied attachment style or not having a secure attachment style increased the risk of having a diagnosis threefold; finally, adolescents with a fearful attachment style were five and a half times more likely of presenting a CPTSD diagnosis.

In the Indian sample, exposure to one ACE, exposure to 2-3 ACE, and exposure to 4-5 ACE were significantly associated with CPTSD diagnosis. Adolescents exposed to one ACE were five and a half times more likely of presenting a CPTSD diagnosis; exposure to 2-3 ACE increased the risk of CPTSD diagnosis two and a half times; and exposure to 4-5 increased the risk of CPTSD diagnosis nearly three times. In the Ugandan sample, only exposure to 4-5 ACE and exposure to six or more ACE were significantly associated with CPTSD diagnosis. Ugandan adolescents exposed to 4-5 ACE were approximately two and a half times more likely to have a CPTSD diagnosis, and adolescents exposed to six or more ACE were one and a half more likely of being diagnosed with CPTSD.

Table 8

Results of the Multinomial Logistic Regression for CPTSD: Cumulative ACE

	Ugandan		Indian	
	Odds ratio	CI interval	Odds ratio	CI interval
Sex (female)	1.24	(0.83, 1.85)	1.00	(0.61, 1.63)
Living arrangements (One parent or other arrangements)	1.24	(0.82, 1.87)	1.51	(0.50, 4.59)
Secure (No)	1.38	(0.90, 2.12)	3.04***	(1.92, 4.83)
Preoccupied	1.26	(0.76, 2.10)	3.36***	(1.72, 6.58)
Dismissing	1.60	(0.85, 2.99)	1.87*	(1.02, 3.43)
Fearful	1.41	(0.81, 2.47)	5.40***	(2.80, 10.42)
ACE (1)	3.22	(0.60, 10.14)	4.51***	(1.89, 10.78)
ACE (2-3)	1.44	(0.42, 4.94)	2.54*	(1.13, 5.69)
ACE (4-5)	2.34*	(1.21, 4.54)	2.86**	(1.33, 6.15)

ACE (≥ 6)	1.68*	(1.02, 2.79)	1.63	(0.71, 3.73)

Notes: Reference group = None, n = 19,179. Nagelkerke $R^2 = 0.24$.

* p < .05, **p < .01, ***p < .00

Discussion

The main purpose of the present study was to ascertain both the independent and cumulative effects of ACE on the likelihood of PTSD and a CPSTD diagnosis in adolescents from Uganda and India. We also sought to determine if the sex, living arrangements, and attachment style of the Ugandan and Indian adolescents impacted the likelihood of a PTSD or CPTSD diagnosis.

Our results revealed statistically significant differences between the Indian and Ugandan samples. The Ugandan sample showed higher rates of exposure to ACE in most variables, except for traffic accidents, which were higher in the Indian sample. Furthermore, there were significant differences between the samples in terms of attachment styles, with a higher proportion of secure attachment style observed in the Indian sample, and a higher proportion of preoccupied and fearful attachment styles in the Ugandan sample. Additionally, the prevalence of participants diagnosed with PTSD and CPTSD was higher in the Ugandan sample.

Sex was the only sociodemographic characteristic that was significantly associated with PTSD diagnosis, but only in the Ugandan sample, as females were twice as likely to be diagnosed with PTSD. Regarding attachment, fearful attachment style was significantly associated with PTSD in both samples. Additionally, in the Indian sample, not having a secure attachment or having a preoccupied attachment style is associated with a two-fold increased risk of PTSD diagnosis.

Diverse associations between independent ACE and PTSD diagnosis were found between both samples. In the Ugandan sample, exposure to physical violence, witnessing injury or death, and attempted suicide were significantly linked to PTSD diagnosis. In the Indian sample, only bullying and threats of violence, and the death of a loved one were significantly associated with PTSD diagnosis. Regarding the relationship between cumulative ACE exposure and PTSD diagnosis, in the Indian sample, exposure to one ACE or 2-3 ACE showed a significant association with PTSD diagnosis. In the Ugandan sample, exposure to 2-3 ACE or 4-5 ACE was significantly linked to PTSD diagnosis.

Neither sociodemographic characteristics were significantly associated with CPTSD diagnosis. Regarding the relationship between categorical attachment styles and CPTSD diagnosis, notable differences were observed between both samples. In the Ugandan sample, only the dismissing attachment style showed a significant association with CPTSD diagnosis. In the Indian sample, both the preoccupied and fearful attachment styles, as well as the absence of a secure attachment, showed significant associations with CPTSD diagnosis.

In terms of the relationship between independent ACE exposure and CPTSD diagnosis, significant variations were observed between both samples. Both exposure to physical violence and bullying and threats of violence were significantly associated with CPTSD diagnosis, in the Indian sample. In the Ugandan sample, sexual abuse, bullying and threats of violence, and near-drowning were significantly associated with CPTSD diagnosis. Concerning the relationship between cumulative exposure to ACE and CPTSD diagnosis, in the Indian sample, there were significant associations between the number of ACE exposures and CPTSD diagnosis, with the sole exception of exposure to six or more ACE. In the Ugandan sample, only exposure to 4-5 ACE and exposure to six or more ACE were significantly associated with CPTSD diagnosis. These results will be discussed in turn.

Prevalence of PTSD/CPTSD

PTSD prevalence rates in both samples were similar to other studies with African and South Asian LALMIC samples (Ainamani et al., 2022; Bayer et al., 2007; Catani et al., 2008; Catani et al., 2009; Okello et al., 2008; Pfeiffer & Elbert, 2011; Roberts et al., 2008), with the Ugandan sample having a significantly higher prevalence than the Indian sample. The Ugandan sample (36.2%) had a CPTSD prevalence similar to other African LALMIC studies (30.6–37.0%), while the Indian sample (18%) was better compared to Western samples (2–12.7%) (Cloitre, 2020). We propose that the higher socioeconomic status of the Indian sample decreased scores in two CPTSD clusters, negative self-concept and affective dysregulation, suggesting that socioeconomic status plays a significant role in CPTSD development. Higher socioeconomic status is linked to higher self-esteem (Twenge & Campbell, 2002) and better emotion regulation (Evans & De France, 2021).

The independent effect of ACE

Our multinomial logistic regression for the independent effect of ACE in PTSD is somewhat consistent with the literature. In Uganda, witnessing other people injured or killed, physical violence, and attempted suicide significantly increased the likelihood of a PTSD diagnosis, while in India, only bullying and threats of violence and serious illness did. Previous research linked these events to PTSD (Brockie et al., 2015; Kousha & Tehrani, 2013;

Nielsen et al., 2015; Parker et al., 2015; Stanley et al., 2018). However, previous literature suggests that other ACE, such as sexual abuse (Gospodarevskaya & Segal, 2012) or near-drowning (Hyland et al., 2017), are also associated with PTSD. These did not affect the odds ratio for PTSD in either sample.

Previous research has suggested that interpersonal ACE are more likely to cause CPTSD than PTSD (Cloitre et al., 2013; Herman, 1992; Hyland, 2016; Hyland et al., 2017). Accordingly, our results indicate that four interpersonal ACE and one non-interpersonal ACE increased CPTSD risk in both samples. In the Ugandan sample, sexual abuse and bullying and threats of violence, and near-drowning almost doubled the odds of a CPTSD diagnosis, while in the Indian sample, physical violence and bullying and threats of violence doubled and two and a half times, respectively. Sexual abuse increased the likelihood of a CPTSD diagnosis in Uganda but not in India, possibly because only 13 (3.2%) Indian adolescents reported sexual abuse. Sexual abuse and other forms of interpersonal ACE may have a greater association with CPTSD than non-interpersonal ACE due to the effect they may have on the development of the three CPTSD symptom clusters that distinguish it from PTSD. Interpersonal ACE imply adverse social outcomes and effects on social interactions, such as a vulnerability to negative self-concept and relationship disturbance, insofar as these types of ACE have been linked to states of self-harm (Saçarçelik et al., 2013) self-disgust (Overton et al., 2015), social withdrawal, disconnection, and isolation (Johnson et al., 2004).

Bullying and threats of violence were the only ACE associated with CPTSD in both samples and PTSD in the Indian sample. These findings are consistent with previous research showing that bullying, which often involves social exclusion, betrayal, or victimisation by peers, increases the risk of PTSD in adolescents (Chen & Elklit, 2017; Daniunaite et al., 2021; Idsoe, 2012). Being targeted and mistreated by people they should trust and feel safe with can lead to profound betrayal, resulting in a complex interplay of emotions and maladaptive coping mechanisms (Goldberg & Freyd, 2006; Obrdajj, 2013).

The cumulative effect of ACE

Our findings, regarding the cumulative effect of ACE on PTSD and CPTSD, do not suggest a linear dose-response relationship between ACE exposure and PTSD/CPTSD as indicated by previous research, conducted with samples from LALMIC, that reported that for each additional adversity experienced, the odds of

PTSD increased significantly (Catani et al., 2008; Catani et al., 2009; Eide & Dyrstad, 2019; Jonas et al., 2022; Kidman et al., 2020; Panter-Brick et al., 2009; Pfeiffer & Elbert, 2011; Roberts et al., 2008). Instead, our results are in line with studies that indicated that cumulative ACE exposure may be more strongly associated with either PTSD or CPTSD, depending on the number of ACE a person has been exposed. For example, Cloitre et al., (2019), reported that cumulative childhood trauma exposure was much more strongly associated with CPTSD in comparison with PTSD, while Kairyte et al. (2022), indicated that ACE exposure exhibited varying associations with PTSD and CPTSD, specifically, individuals exposed to less than four ACE were found to be at a higher risk for developing PTSD as compared to CPTSD. Conversely, those exposed to six or more ACE were found to be at a greater risk for developing CPTSD.

Sex, Living Arrangements and Attachment Style on PTSD/CPTSD

In our study, we found that in the Ugandan sample, being female doubled the likelihood of a PTSD diagnosis, consistent with prior research (Christiansen & Hansen, 2015; Clarke et al., 2016). However, this gender difference was not observed in the Indian sample. Gendered disparities in traumatic experiences may place females at a higher vulnerability to PTSD. Specifically, instances such as childhood sexual abuse are more prevalent among females compared to males (Asnakew et al., 2019; Ayazi et al., 2014; Rugema et al.,2015; Ssenyonga et al., 2012), when we consider that only 13 (3.2%) Indian adolescents reported sexual abuse, this could be an explanation as to why being female did not increase the odds for a PTSD diagnosis in this sample. As for a CPTSD diagnosis, being female did not significantly impact the odds, which is a similar result reported in a previous study by Hyland et al. (2017), that points to sex not being a risk factor for CPTSD.

Our findings on the effects of attachment styles on the development of PTSD partially reflect the existing literature on this topic. Specifically, the dismissing attachment style does not have a statistically significant association with PTSD and the fearful attachment style is the one with the highest predictive weight for PTSD. However, a meta-analysis (Woodhouse et al., 2015) and a systematic review (Barazzone et al., 2019) indicate that the preoccupied attachment style is linked to PTSD, which is not reflected in our study results. As for the effects of attachment styles on the development of CPTSD, results from both samples are the opposite of each other, as all non-secure attachment styles significantly impacted the odds of CPTSD in Indian adolescents while neither one had a significant effect in Ugandan adolescents. Although the results from the Indian sample go some way towards meeting the limited literature on attachment styles and CPTSD, in the sense that fearful and dismissing

attachment styles increased the odds of CPTSD (Karatzias et al., 2021) the same was not true for the preoccupied attachment style or all attachment styles in the Ugandan sample.

The available data in this study does not provide an explanation for the observed contradiction. However, it is worth mentioning that a previous study conducted in three Nordic countries, which had representative samples, revealed that a majority of Faroese adolescents who were diagnosed with PTSD had a secure attachment. The study also found that gender, attachment style, and traumatic events could only account for 40% of the variation in PTSD (Petersen & Elklit, 2013). Despite the focus of this study being on PTSD rather than CPTSD, it prompts consideration regarding the efficacy of utilising attachment style to determine the correlation between attachment and CPTSD. It suggests that other factors may have a more significant impact on the relationship between ACE exposure and CPTSD in the context of Ugandan adolescents. Maercker et al. (2021) have put forth a cascade model of CPTSD, wherein they have reported that childhood sexual abuse, an ACE that has been found to increase the likelihood of CPTSD in the Ugandan sample, did not exhibit a statistically significant correlation with attachment avoidance or anxiety. This finding may provide an explanation for why attachment did not emerge as a significant factor for CPTSD in the Ugandan context. Interestingly, Maercker et al. (2021) study also revealed that attachment anxiety and avoidance displayed noteworthy associations with socio-interpersonal factors, including social support (perceived social integration, practical support, and emotional support), and these factors were subsequently linked to symptoms of CPTSD. Future studies should analyse the relationship between attachment orientations or typologies and socio-interpersonal factors, and how this interacts with the relationship between ACE exposure and poorer mental health outcomes, such as PTSD/CPTSD.

Limitations

While the results of this study shed light on the association between ACE exposure, attachment, and the development of PTSD and CPTSD in adolescents from LALMIC, it is important to acknowledge certain limitations that must be considered when interpreting the findings. First, self-report measures may have led to memory bias, although the event list method was chosen to facilitate recognition rather than recall (Willis & Gonzalez, 1998). Future studies could utilize semi-projective measures like the "Darryl" PTSD cartoon test (Løkkegaard et al., 2023). Second, non-

probability convenience sampling limits the generalizability of findings (Jager et al., 2017). The Indian sample's middle- and upper-class composition affects representativeness, neglecting individuals experiencing social and economic adversities (Narasimhan et al., 2019). Studies with nationally representative samples are important in psychotraumatology, considering ethnic influences on ACE and mental health outcomes (Elkins et al., 2019). Third, Cronbach alpha values for PTSD and CPTSD scales in the Indian sample were below the recommended threshold of 0.8, suggesting variability or measurement error (Karatzias et al., 2017). Future studies should use alternative or refined measurement scales for improved internal consistency. Fourth, the data utilised in this study was collected in 2012, therefore it may not be representative of the current landscape. Fifth, the lack of information on the number of times respondents experienced ACE hinders understanding the cumulative effects on CPTSD. Latent profile analysis (LPA) could identify distinct profiles based on trauma exposure (Mathew & Doorenbos, 2022). Sixth, the ACE measurement list used may not capture all relevant events, neglecting some ACE types and LALMIC-specific events like child labour or female genital mutilation (Ainamani et al., 2022; Brockie et al., 2015). Validating the ACE list in India and Uganda is essential for better accuracy. Seventh, the source of interpersonal ACE and its impact on mental health were not measured, limiting our understanding of the effects (Cloitre et al., 2019). As is shown in the study by Bernard-Bonnin et al. (2008) sexual abuse perpetrated by a non-parent figure was associated with PTSD. Eighth, limited data collection on family dynamics hinders inferences on family factors and PTSD or CPTSD development. Future studies should collect comprehensive information about family typology (Chadda & Deb, 2013). Nineth, attachment was measured solely through attachment styles, overlooking other aspects like parent-child interactions and the quality of the caregiver-child relationship (Bowlby, 1988). Further research should explore these aspects to better understand the link between attachment, ACE, and trauma-related disorders.

Implications

Based on the limitations of the current study, several recommendations for future research emerge. Firstly, longitudinal designs should be employed to examine temporal relationships, developmental trajectories, and long-term effects of ACE on PTSD and CPTSD. Secondly, probabilistic sampling methods and nationally representative samples should be utilized to address limitations in sample selection. Additionally, integrating multiple data collection methods, such as clinical interviews and observational assessments, can enhance the reliability of findings. Exploring intracultural differences within LALMIC is

also recommended, considering diverse contexts and factors like ACE, attachment, and trauma-related psychopathology. This approach will deepen understanding of the unique dynamics within LALMIC countries, contributing to the field of psychotraumatology.

Several trauma treatment models have been developed for children, targeting specific types of trauma or events (Grossman & Tierney, 1998). However, addressing exposure to multiple traumatic events is crucial, especially in LALMIC countries with a significant youth population, and research on polytraumatization and mental health in LALMIC, like Uganda and India, is lacking (Le et al., 2018). Effective prevention initiatives require comprehensive, age-appropriate approaches to meet the specific needs of affected minors and teenagers (Finkelhor et al., 2007; Grossman & Tierney, 1998). Strengthening community systems, raising awareness, and providing comprehensive interventions with local resources are crucial (Grossman & Tierney, 1998). Early intervention tailored to adolescents' developmental needs is critical (Cuijpers et al., 2020) and schools play a vital role in identifying at-risk adolescents and providing support through school-based interventions (Van Loon et al., 2019). Collaborative efforts involving schools, families, and communities are essential for promoting resilience in adolescents exposed to ACE (Ellis & Dietz, 2017; Oshri et al., 2015; Williams & Bryan, 2013).

Conclusion

Despite these limitations, our study results contribute significantly to enhancing our understanding of the intricate association between ACE and the development of PTSD or CPTSD in adolescents from LALMIC. Both the independent and cumulative effects analysis yielded valuable insights into this relationship.

The independent effect analysis particularly sheds light on the connection between ACE and CPTSD, rather than PTSD, as interpersonal ACE demonstrated a more pronounced impact on CPTSD in both samples. On the other hand, the cumulative effect analysis appears relevant to both disorders, as lower ACE exposure had the greatest influence on the likelihood of developing PTSD in both samples, whereas higher ACE exposure heightened the probability of developing CPTSD.

Furthermore, it is noteworthy that being female exacerbates vulnerability solely in the context of PTSD development. As for the relationship between attachment styles and PTSD, the findings align with our expectations. However, future investigations exploring the connection between attachment styles and CPTSD may

benefit from incorporating socio-interpersonal factors to provide a more comprehensive understanding of this phenomenon.

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OVERALL DISCUSSION

Overall Discussion

The main purpose of this dissertation was to ascertain both the independent and cumulative effects of ACE exposure on mental health outcomes, namely on the likelihood of PTSD and a CPSTD diagnosis. Specifically, we aimed to gain a deeper understanding of how individual types of ACE may be linked to PTSD and CPTSD, as well as explore the differential impact of these effects on the development of PTSD and CPTSD among Indian and Ugandan adolescents. Furthermore, we sought to assess the contributions of sociodemographic variables, such as sex and living arrangements, as well as attachment styles, to the likelihood of developing PTSD and CPTSD. These objectives were accomplished through the empirical study conducted within this dissertation, which provided valuable insights into the complex relationships between ACE exposure and mental health outcomes, shedding light on specific factors that contribute to the development of PTSD and CPTSD among LALMIC adolescent populations.

Our findings revealed notable differences between the Indian and Ugandan samples in terms of ACE exposure, attachment styles, and PTSD/CPTSD diagnosis. The Ugandan sample showed higher rates of ACE exposure, except for traffic accidents, which were more prevalent in the Indian sample. Attachment style also differed between the samples, with the Indian sample having a higher proportion of secure attachment and the Ugandan sample showing higher proportions of preoccupied and fearful attachment styles. Moreover, the prevalence of PTSD/CPTSD diagnosis was higher in the Ugandan sample.

In terms of sociodemographic characteristics, only sex was significantly associated with PTSD diagnosis, specifically in the Ugandan sample, where females were twice as likely to be diagnosed with PTSD. Fearful attachment style was significantly associated with PTSD in both samples, while in the Indian sample, not having a secure attachment or having a preoccupied attachment style increased the risk of PTSD diagnosis.

Regarding independent ACE exposure, the associations with PTSD diagnosis varied between the samples. In the Ugandan sample, exposure to physical violence, witnessing injury or death, and attempted suicide were significantly linked to PTSD diagnosis. In the Indian sample, bullying and threats of violence, and the death of a loved one showed significant associations with PTSD diagnosis. In terms of cumulative ACE exposure and PTSD diagnosis, exposure to one ACE or 2-3 ACE was significantly associated with PTSD diagnosis in the Indian sample, while in the Ugandan sample, exposure to 2-3 ACE or 4-5 ACE showed significant associations.

Sociodemographic characteristics did not show significant associations with CPTSD diagnosis. In terms of categorical attachment styles and CPTSD diagnosis, differences were observed between the samples. The dismissing attachment style was significantly associated with CPTSD diagnosis in the Ugandan sample, while in the Indian sample, both preoccupied and fearful attachment styles, as well as the absence of a secure attachment, showed significant associations.

Regarding independent ACE exposure and CPTSD diagnosis, the relationships varied between the samples. In the Indian sample, exposure to physical violence and bullying and threats of violence were significantly associated with CPTSD diagnosis. In the Ugandan sample, sexual abuse, bullying and threats of violence, and near-drowning showed significant associations with CPTSD diagnosis. Cumulative ACE exposure and CPTSD diagnosis were significantly associated with the number of ACE exposures in the Indian sample, except for exposure to six or more ACE. In the Ugandan sample, exposure to 4-5 ACE and exposure to six or more ACE were significantly associated with CPTSD diagnosis. These results will be discussed in turn.

Differences between Uganda and India

Firstly, statistically significant differences in age, living arrangements, and rates of ACE exposure between the Indian and Ugandan samples prevented multinomial logistic regressions from being performed on a combined sample. Ugandans were older and more evenly distributed across the age range than Indians, who were mostly 14 years old and only one was 16 or older. The majority (96.1%) of Indian participants lived with both parents, while the Ugandan sample was more homogeneous: 42.4% lived with both parents, 35.4% with one parent, and 22.2% with other relatives. The distribution of living arrangements in both samples is in accordance with previous research data from studies. Uganda has a lengthy history of socio-political crises, including a civil war in northern Uganda and being a part of Sub-Saharan Africa's AIDS crisis in the 1990s. These crises had an impact on family structures due to human and economic losses that the country endured. In 2011 only 56% of Ugandan children aged 0-17 lived with both biological parents, 25% lived with one parent, and 19% lived without either parent (Better Care Network, 2015). This led to prolonged socio-economic difficulties, as families that are disintegrated, i.e., do not feature both parents, may have greater educational and employment difficulties (Ntozi & Zirimenya, 1999). As for India’s family arrangements prevalence patterns, despite the country’s rampant industrialisation and urbanisation, households

with both parents have steadily increased and is the social norm for most people (Breton, 2019).

Although we do not have data regarding the income levels for both samples, as we only know that the Indian adolescents were mainly from middle- and upper-class backgrounds, we may infer that the Ugandan adolescents lived under more precarious economic conditions due to the differences in living arrangements and social context. This may explain the disparity between both samples in age range, even though they were all 8th-grade students, in the sense that poverty significantly impacts the available resources for students, thereby posing challenges to their academic achievement. The lack of resources among these students hinders their ability to have an adequate academic record and subsequently educational progression, resulting in a heterogeneous age range in the same scholar grade (Lacour & Tissington, 2011).

Apart from serious accidents, Ugandan adolescents reported statistically significant higher rates of exposure to all the other ACE when compared to their Indian counterparts. These differences may be explained not only by the cultural differences between both countries, as India is not suffering social consequences from an armed conflict (unlike Uganda), but also by the sampling method limitations of our study. The fact that most Indian adolescents came mainly from middle- and upper-class backgrounds may have skewed the prevalence rate of ACE, since having a lower childhood socioeconomic position is associated with a greater risk for ACE exposure (Walsh et al., 2019).

Statistically significant differences between both samples were also verified in the prevalence rates of the categorical attachment styles. Although neither of the samples is representative of the population, these differences highlight evidence in the literature that has shown that the distribution of different attachment styles varies according to the cultural context (Petersen & Elklit, 2013; Van IJzendoorn & Kroonenberg, 1988).

The Ugandan sample had significantly higher rates of preoccupied and fearful attachment styles and significantly lower rates of secure attachment style. With insufficient data regarding family dynamics of both samples, we hypothesize that these disparities may be connected to the differences in living arrangements, in the sense that adolescents from single-parent families are more likely to be insecurely attached (Nwagboso, 2018). Another factor that may have contributed to a higher prevalence of insecure attachment styles in the Ugandan sample is its greater rates of ACE exposure, as being a victim of childhood physical violence, an ACE that was substantially more prevalent amongst Ugandan adolescents, is linked to the development of an insecure attachment style (Unger & De Luca, 2014).

Prevalence of PTSD/CPTSD

Prevalence rates of PTSD in both samples were similar to other studies with African and South Asian LALMIC samples (Ainamani et al., 2022; Bayer et al., 2007; Catani et al., 2008; Catani et al., 2009; Okello et al., 2008; Pfeiffer & Elbert, 2011; Roberts et al., 2008), with the nuance that PTSD was significantly more prevalent in the Ugandan sample when compared to its Indian counterpart. The prevalence of CPTSD in the Ugandan sample (36.2%) was similar to other studies in African LALMIC in which rates for CPTSD ranged between 30.6 to 37.0%, whereas the Indian sample prevalence of CPTSD (18%) was better compared with other samples from western countries in which rates ranged between two and 12.7% (Cloitre, 2020). These results may suggest that the socioeconomic membership of a person has a significant role in the development of CPTSD, we hypothesize that the higher socioeconomic status of the Indian sample led to a decrease in scores in two clusters of CPTSD, negative self-concept and affective dysregulation. This speculation is supported by existing evidence indicating that higher socioeconomic status correlates with elevated levels of self-esteem (Twenge & Campbell, 2002) and improved efficacy in emotion regulation (Evans & De France, 2021).

The independent effect of ACE

Considering the multinomial logistic regression for the independent effect of ACE in PTSD, our results are somewhat consistent with the existing literature. In the Ugandan sample, the ACE that significantly increased the likelihood of having a PTSD diagnosis were witnessing other people injured or killed, physical violence, and attempted suicide, whereas in the Indian sample only bullying and threats of violence, and serious illness increased the probability of having a PTSD diagnosis. These findings are supported by previous research that reported a link between these events and a higher risk of developing PTSD (Brockie et al., 2015; Kousha & Tehrani, 2013; Nielsen et al., 2015; Parker et al., 2015; Stanley et al., 2018). However, previous literature also suggests that other ACE are also associated with a PTSD diagnosis, such as sexual abuse (Gospodarevskaya & Segal, 2012) or near-drowning (Hyland et al., 2017) and those did not have a significant impact on the odds ratio for PTSD in either of the samples.

Research suggests that interpersonal ACE that are prolonged, repeated, or include characteristics that make an escape difficult or impossible are more likely to cause CPTSD than PTSD (Cloitre et al., 2013; Herman, 1992; Hyland et al., 2016).

Because of this, it would be expected that interpersonal ACE would be linked to a higher likelihood of CPTSD. Our results are in line with this prospect as four interpersonal ACE, and only one non-interpersonal increased the likelihood of CPTSD across both samples. In the Ugandan sample, sexual abuse and bullying and threats of violence, and near-drowning increased the likelihood of a CPTSD diagnosis almost twofold, while in the Indian sample physical violence and bullying and threats of violence increased the odds of a CPTSD diagnosis by twofold and two and a half times respectively. Interestingly, having suffered sexual abuse increased the likelihood of a CPTSD diagnosis in the Ugandan sample, but not in the Indian sample, which could be due to only 13 (3.2%) Indian adolescents reporting sexual abuse. It is postulated that sexual abuse and other forms of interpersonal ACE have a greater association with CPTSD when compared to non-interpersonal ACE due to the impact they may produce on the development of the three CPTSD symptom clusters that differentiate it from PTSD, as these types of ACE entail adverse social outcomes and effects on social interactions, such as a vulnerability to negative self-concept and relationship disturbance, insofar as these types of ACE have been linked to states of self-harm (Saçarçelik et al., 2013) self-disgust (Overton et al., 2015), social withdrawal, disconnection, and isolation (Johnson et al., 2004)

Bullying and threats of violence was the only ACE to significantly increase the likelihood of a CPTSD diagnosis in both samples and PTSD in the Indian sample. These results are in accordance with previous literature as several studies reported that bullying increased the risk for the development of PTSD symptoms among adolescents (Chen & Elklit, 2017; Daniunaite et al., 2021; Idsoe et al., 2012), as bullying often involves social exclusion, betrayal, or victimization by peers, which can exacerbate the trauma experienced by the individual. Being targeted and mistreated by individuals they should trust and feel safe with can lead to feelings of profound betrayal, resulting in a complex interplay of emotions and maladaptive coping mechanisms (Goldberg & Freyd, 2006; Obrdajj et al., 2013).

The cumulative effect of ACE

The cumulative effect of ACE on PTSD, in the Indian sample, the results show that exposure to a single ACE increased the probability of a PTSD diagnosis by approximately seven times. Furthermore, exposure to 2-3 ACE increased the likelihood of PTSD diagnosis by two times. However, exposure to 4-5 or 6 or more ACE did not result in a statistically significant increase in PTSD diagnosis. In an equivalent manner, in the Ugandan sample, exposure to 2-3 ACE increased the risk of PTSD diagnosis by almost nine times, while

exposure to 4-5 ACE increased the likelihood of PTSD diagnosis by twofold. However, being exposed to 6 or more ACE did not increase the odds of receiving a PTSD diagnosis.

As for the cumulative effect of ACE on CPTSD in the Indian sample, we found that exposure to one ACE increased the likelihood of PTSD diagnosis by four and a half times, 2-3 ACE increased it by two and a half, 4-5 ACE increased it by nearly three times, however, 6 or more ACE did not produce a statistically significant increase, while in the Ugandan sample, only exposure to 4-5 ACE and exposure to six or more ACE were significantly associated with CPTSD diagnosis as Ugandan adolescents exposed to 4-5 ACE were approximately two and a half times more likely to have a CPTSD diagnosis, and those exposed to 6 or more ACE were one and a half times more likely to be diagnosed with CPTSD.

These findings do not suggest a linear dose-response relationship between ACE exposure and PTSD/CPTSD as indicated by previous research, conducted with both LALMIC and other countries' samples, that reported that for each additional adversity experienced, the odds of PTSD increased significantly (Brockie et al., 2015; Catani et al., 2008; Catani et al., 2009; Cloitre et al., 2019; Eide & Dyrstad, 2019; Jonas et al., 2022; Kidman et al., 2020; Panter-Brick et al., 2009; Pfeiffer & Elbert, 2011; Roberts et al., 2008). Instead, our results are in line with studies that indicated that cumulative ACE exposure may be more strongly associated with either PTSD or CPTSD, depending on the number of ACE a person has been exposed. Cloitre et al. (2019), reported that cumulative childhood trauma exposure was much more strongly associated with CPTSD in comparison with PTSD, while Kairyte et al. (2022), indicated that ACE exposure exhibited varying associations with PTSD and CPTSD, specifically, individuals exposed to less than four ACE were found to be at a higher risk for developing PTSD as compared to CPTSD. Conversely, those exposed to six or more ACE were found to be at a greater risk for developing CPTSD.

Sex, Living Arrangements and Attachment Style on PTSD/CPTSD

Results from our study show that being female increased the likelihood of a PTSD diagnosis two-fold, which goes in line with previous research (Christiansen & Hansen, 2015; Clarke et al., 2016), but this was only true for the Ugandan sample as the same did not occur for the Indian sample. Gendered disparities in traumatic experiences may place females at a higher vulnerability to PTSD. Specifically, instances such as childhood sexual abuse are more prevalent among females compared

to males (Asnakew et al., 2019; Ayazi et al., 2014; Rugema et al.,2015; Ssenyonga et al., 2012), when we consider that only 13 (3.2%) Indian adolescents reporting sexual abuse, this could be the reason to explain why being female did not increase the odds for a PTSD diagnosis in this sample. As for a CPTSD diagnosis, being female did not significantly impact the odds, which is a similar result reported in a previous study by Hyland et al. (2017), that points to sex not being a risk factor for CPTSD.

It is of note that although living arrangements did not significantly impact the odds of a PTSD or CPTSD diagnosis, concurrent effects of social variables in the adolescent context may play a part in the relationship between the sex and PTSD/CPTSD diagnosis, specifically those related to the family setting as showed by Bernard-Bonnin et al. (2008) that reported that most sexually abused girls came lived in a single-parent home. However, when making this assumption, one must be cautious as the variable living arrangements may not have been optimally operationalised, insofar as family functioning (Bernard-Bonnin et al., 2008) as well as family structure (Kaggwa et al., 2022) have stronger predictive effects for PTSD and CPTSD.

Our results show that having a non-secure attachment style increased PTSD diagnosis odds virtually two-fold, but only in the Indian sample, whereas having a fearful attachment style amplified the odds for PTSD diagnosis by almost three and a half in the Ugandan sample and two and a half in the Indian sample. As for the effect of attachment on CPTSD, in the Indian sample, all non-secure attachment styles significantly heightened the odds of a CPTSD diagnosis, as having a preoccupied attachment style increased this likelihood by nearly three and a half times and a fearful attachment style had a stronger effect with an almost five and a half increase of the risk, while the dismissing attachment style had a smaller effect when compared to the previous two attachment styles with an increase of almost two times. As for the Ugandan sample, none of the attachment styles had a statistically significant effect on the likelihood of a CPTSD diagnosis.

Our findings on the effects of attachment styles on the development of PTSD partially reflect the existing literature on this topic. Specifically, the dismissing attachment style does not have a statistically significant association with PTSD and the fearful attachment style is the one with the highest predictive weight for PTSD, however, a meta-analysis (Woodhouse et al., 2015) and a systematic review (Barazzone et al., 2019) indicate that the preoccupied attachment style is linked to PTSD, which is not reflected in our study's results. As for the effects of attachment styles on the development of CPTSD, results from both samples are the opposite of each other, as all non-secure attachment styles significantly impacted the odds of

CPTSD in Indian adolescents while neither one had a significant effect in Ugandan adolescents. Although the results from the Indian sample go some way towards meeting the limited literature on attachment styles and CPTSD, in the sense that fearful and dismissing attachment styles increased the odds of CPTSD (Karatzias et al., 2021) the same was not true for the preoccupied attachment style or all attachment styles in the Ugandan sample.

The available data in this study does not provide a clear explanation for the observed contradiction. However, it is worth mentioning that a previous study conducted in three Nordic countries, which had representative samples, revealed that a majority of Faroese adolescents who were diagnosed with PTSD had a secure attachment. The study also found that gender, attachment style, and traumatic events could only account for 40% of the variation in PTSD (Petersen & Elklit, 2013). Despite the focus of this study being on PTSD rather than CPTSD, it prompts consideration regarding the efficacy of utilising attachment style to determine the correlation between attachment and CPTSD. It suggests that other factors may have a more significant impact on the relationship between ACE exposure and CPTSD in the context of Ugandan adolescents. Maercker et al. (2021) have put forth a cascade model of CPTSD, wherein they have reported that childhood sexual abuse, an ACE that has been found to increase the likelihood of CPTSD in the Ugandan sample, did not exhibit a statistically significant correlation with attachment avoidance or anxiety. This finding may provide an explanation for why attachment did not emerge as a significant factor for CPTSD in the Ugandan context. Interestingly, this study revealed that attachment anxiety and avoidance displayed noteworthy associations with socio-interpersonal factors, including social support (perceived social integration, practical support, and emotional support), and these factors were subsequently linked to symptoms of CPTSD. Future studies should analyse the relationship between attachment orientations or typologies and socio-interpersonal factors, and how this interacts with the relationship between ACE exposure and poorer mental health outcomes, such as PTSD/CPTSD.

Limitations

While the results of this study shed light on the association between ACE exposure, attachment, and the development of PTSD and CPTSD in adolescents from LALMIC, it is important to acknowledge certain limitations that must be considered when interpreting the findings. First, data utilised in this research were obtained from

self-report measures. The employment of this particular methodology could have led to a memory bias. However, it is assumed that utilising an event list confers advantages over an interview due to its facilitation of recognition rather than recall. According to Willis and Gonzalez (1998), this method is less distressing compared to narrating emotionally challenging experiences. Future studies could also employ semi-projective measures to mitigate the constraints of self-report measures, such as the "Darryl" PTSD cartoon test (Løkkegaard et al., 2023).

A different limitation of our study is the sampling method, which was non-probability convenience, and thus both samples lack the necessary representativeness and randomness required for making broad generalizations (Jager et al., 2017). Regarding the Indian sample, the fact that the adolescents were mainly from middle- and upper-class backgrounds, which does not correspond to the norm in this population, significantly impacts the generalisation of these data since not only it is not representative but also individuals experiencing social and economic adversities have a high prevalence and risk for mental health issues, which adds to India's complexity and risk (Narasimhan et al., 2019). Studies with nationally representative samples are especially important in the psychotraumatology field as ethnicity has a role in the relationship between ACE and negative mental health outcomes, such as PTSD (Elkins et al., 2019). Another factor to consider regarding the validity of our sampling is the date when it was obtained as the data utilised in this study was collected in 2012, therefore it may not be representative of the current landscape.

A statistical limitation of this study pertains to the Cronbach alpha values obtained for the item sets measuring PTSD and CPTSD in the Indian sample. The Cronbach alpha, which indicates the internal consistency of the measurement scales, was found to be below the commonly recommended threshold of 0.8. Although the Cronbach alpha values were still deemed acceptable, this limitation suggests that there may be some variability or measurement error in the item sets used to assess PTSD and CPTSD in the Indian sample. Future studies should consider utilizing alternative or refined measurement scales to improve the internal consistency and reliability of these constructs in this specific population.

According to the ICD-11, CPTSD is a disorder that may develop following exposure to an event or series of events of an extremely threatening or horrific nature, most commonly prolonged or repetitive events from which escape is difficult or impossible (e.g., torture, slavery, genocide campaigns, prolonged domestic violence, repeated childhood sexual or physical abuse). Since we do not have access to the number of times the respondents experienced the different ACE, and because CPTSD is more associated with a greater

accumulation of different types of childhood traumatic experiences (Karatzias et al., 2017), a better method to assess this exposure would be through a LPA. The utilisation of LPA has been gaining prominence as a sophisticated method of statistical clustering. The modelling technique employs a person-centric methodology to categorise individuals from a diverse population into groups that share similar characteristics, and to detect latent subgroups or profiles within a population by analysing patterns of observable variables. Within the field of psychotraumatology, LPA can be employed to identify discrete categories or groupings of individuals who have undergone traumatic experiences and exhibit varying presentations of symptoms, coping strategies, or responses to treatment. By identifying these profiles, scholars can better comprehend the diversity within populations that have experienced trauma (Mathew & Doorenbos, 2022).

The findings of our study indicate that the experience of childhood sexual abuse does not inevitably lead to the development of PTSD or CPTSD. This aligns with prior research that has demonstrated the potential for individuals to derive advantages from exposure to adverse life events, such as sexual abuse. Exposure to ACE has been linked to the development of greater resilience, improved interpersonal relationships, a heightened sense of self, and increased empathy (Aldwin et al., 1996). McMillen et al. (1995) reported that a number of women from LALMIC who had experienced childhood sexual abuse reported deriving certain benefits from the experience, such as increased knowledge of child sexual abuse, self-protection, and a more resilient personality. Additionally, these women were able to protect children from abuse.

When assessing the independent and cumulative effects of ACE on the development of PTSD and CPTSD it is crucial to recognize that adolescence represents a vulnerable period for ACE exposure. However, it is important to note that negative mental health outcomes may not manifest during this stage of life but can emerge later. Delayed PTSD refers to a subgroup of individuals who experience a significant lapse between the occurrence of a traumatic event and the onset of PTSD symptoms. In these instances, immediate PTSD symptoms may not be present following the trauma, but rather develop months or even years later, and delayed PTSD may account for up to a quarter of PTSD cases (Smid et al., 2009).

The conceptualization of ACE is not unanimous, and this phenomenon remains unclear in its source and measures (Kalmakis & Chandler, 2013). This issue affects

our results in the sense that the list of 20 life-threatening experiences developed by Bödvarsdóttir and Elklit (2007) used to measure ACE exposure, does not include some ACE that studies have shown to have an association with PTSD such as intimate partner violence (Brockie et al., 2015) and having stayed in two or more homes (Ainamani et al., 2022). Another limitation of this list is that it does not differentiate the typology of neglect the person has suffered from, i.e., if it was physical or emotional neglect. Also, LALMIC do not only differ in ACE prevalence when compared to Western countries but also in terms of the types of events, since LALMIC youth often live in environments in which child labour, war-related violence and, among girls in Africa, female genital mutilation (Benjet, 2010). The fact that our list of 20 life-threatening experiences does not include these and other LALMIC specific ACE, and has not been validated in both India and Uganda hinders the validity of our findings, and it is also important in a clinical context, since some ACE can impact the effectiveness of an intervention, as is shown in a study with former child soldiers in Uganda with clinically relevant symptoms of PTSD that reported significantly less openness to reconciliation and more feelings of revenge than those with few symptoms (Bayer et al., 2007).

Another variable that was not measured in our data collection was the source of the interpersonal ACE. This information could have had a significant impact on determining the effect of certain ACE as childhood sexual abuse not perpetrated by a parent or guardian was associated with PTSD and not CPTSD, indicating that the source influences the impact of an ACE (Cloitre et al., 2019). As the sexual abuser is more often a family member (Bernard-Bonnin et al., 2008) having information about the source of this type of event could enrich our understanding of its impact on mental health.

When examining the influence of living arrangements and attachment styles on the development of PTSD and CPTSD, it is important to consider the limitations of our data collection methods. Specifically, our data collection solely focused on identifying whom the adolescents live with, which restricts our ability to uncover the intricate family dynamics to which the adolescents are exposed. Consequently, the potential inferences regarding the impact of the family factor on the development of PTSD or CPTSD are significantly compromised. Future studies should aim to collect comprehensive information about family typology, such as whether the family structure is nuclear, joint, or extended. This is particularly relevant in the Indian context, where an extended household, which is the most common, may serve as a promoting factor for better mental health (Chadda & Deb, 2013). By

incorporating such information, researchers can obtain a more nuanced understanding of the interplay between family dynamics and the development of PTSD and CPTSD.

When interpreting the findings on attachment and its impact on the development of PTSD and CPTSD, it is crucial to consider two primary limitations. Firstly, our study lacks information regarding the source of ACE. The source of ACE may play a significant role in understanding the relationship between ACE exposure, attachment, and the development of pathologies like PTSD and CPTSD. Within the familial context, parents are responsible for the care and well-being of their children, and healthy parental and parent-child relationships are essential for children's ability to form relationships and cultivate a sense of security (Bowlby, 1988). Secondly, attachment was operationalized solely through attachment styles. While attachment styles provide valuable insights, they offer a limited understanding of the complexity of attachment processes. Future research should explore additional aspects of attachment, such as the avoidant and anxious strategies, parent-child interactions and the quality of the caregiver-child relationship, to enhance our understanding of the mechanisms linking attachment, ACE, and the development of PTSD and CPTSD. By addressing these limitations, researchers can obtain a more comprehensive understanding of the role of attachment in the context of trauma-related disorders.

Implications for future research

Based on the limitations and characteristics of the current study, several recommendations for future research can be proposed to enhance the validity and generalization of findings. Firstly, future studies should consider employing longitudinal designs rather than cross-sectional designs. This would allow for the examination of the temporal relationships between different variables, providing a deeper understanding of the developmental trajectories and long-term effects of ACE on PTSD and CPTSD. Longitudinal designs would also help identify potential causal relationships between variables, shedding light on the mechanisms underlying the development and maintenance of these disorders over time. Secondly, to overcome the limitations of using non-probabilistic convenience samples, future research should strive to employ probabilistic sampling methods and thrive to obtain nationally representative samples. Additionally, to mitigate the reliance on self-report measures, future studies could incorporate multiple methods of data collection. This may include clinical interviews, observational assessments, or the use of objective measures to complement self-report measures. Integrating diverse data sources would provide a

more comprehensive and nuanced understanding of the variables under investigation, reducing potential biases and enhancing the reliability of the findings.

Moreover, it is recommended that future studies explore the intracultural differences within LALMIC. Conducting studies that encompass a more diverse range of intracultural contexts within these countries would provide a deeper understanding of the impact of ACE, attachment, and other relevant factors on the development of PTSD and CPTSD. By considering variations within these cultural contexts, including socioeconomic and demographic factors, future research can illuminate potential differences and similarities in the effects of ACE and attachment on trauma-related psychopathology. This approach will contribute to a more comprehensive knowledge base in the field of psychotraumatology, specifically focusing on the nuanced dynamics within LALMIC countries and their unique cultural contexts.

Clinical Implications

Several trauma treatment models have been developed for children, focusing on addressing specific types of trauma or particular traumatic events (Grossman & Tierney, 1998). However, there is a need for trauma interventions that address exposure to multiple types of traumatic events. This is particularly relevant in LALMIC, where a significant proportion of the global youth population resides. Unfortunately, there is a lack of research addressing polytraumatization and mental health in LALMIC, such as Uganda and India (Le et al., 2018). To enhance the effectiveness of interventions, it is crucial to base them on data from these specific contexts and populations (Le et al., 2018). The present study contributes to the understanding of ACE exposure in LALMIC and provides a foundation for implementing community-based initiatives in these regions. Designing effective prevention initiatives that address polytraumatization requires a comprehensive approach that not only imparts knowledge about violence but also meets the specific needs of polytraumatized minors and teenagers (Finkelhor et al., 2007; Grossman & Tierney, 1998). Strengthening community systems and increasing awareness about polytraumatization are essential first steps in mitigating its prevalence. Additionally, community-based interventions should be comprehensive, developmentally appropriate, and connect youth who have been victimized to local resources (Grossman & Tierney, 1998). Furthermore, it is important for healthcare professionals in financially unstable and socially unsettled nations to prioritize the assessment of the entire traumatic background of patients, rather than solely focusing on the most commonly recognized traumatic experiences. This issue is of particular importance in India as

their annual national healthcare budget has allocated less than 1% to mental health (Patel et al., 2016).

Early intervention, specifically tailored to meet the developmental needs of adolescents, is critical for this age group, as treatment approaches designed for adults or children may not be appropriate (Cuijpers et al., 2020). Schools are well-positioned to identify at-risk adolescents and address their concerns by providing social support and implementing interventions such as school-based skills training and social skills programmes aimed at symptom reduction (Van Loon et al., 2019). Given the importance of social-ecological systems in adolescent mental health, it is strongly advised that service providers work collaboratively with schools, families, and communities to promote resilience in adolescents exposed to ACE. Individual, familial, and societal perspectives should all be considered in this collaborative effort. Service providers should specifically focus on fostering positive family processes, establishing collective goals and shared work plans among community partners, and cultivating supportive relationships within the school-family-community system (Ellis & Dietz, 2017; Oshri et al., 2015; Williams & Bryan, 2013). Adolescents can effectively mitigate the effects of ACE and achieve resilience through adversarial growth by using these approaches.

The different ACE and their independent effects on the development of PTSD and CPTSD do not imply a causal relationship. Instead, it suggests that individuals who have encountered specific types of ACE may be at a heightened risk of developing PTSD or CPTSD. This finding hints at the existence of patterns of circumstances that amplify vulnerability to these disorders, as well as the likelihood and frequency of experiencing these events.

Biopsychosocial implications

Our study revealed significant differences between Ugandan and Indian adolescents in terms of sociodemographic variables, and prevalence rates of ACE, attachment styles, and PTSD and CPTSD diagnosis. These differences underscore the importance of considering cultural and contextual factors when examining the impact of ACE and attachment styles on mental health outcomes in LALMIC populations. Our findings suggest that interventions designed to address the effects of ACE and attachment styles should be tailored to specific cultural contexts to ensure their effectiveness. Additionally, the study highlights the need for more research on how cultural factors influence mental health outcomes in different populations, particularly

in LALMIC where access to mental health services may be limited. Overall, this study provides important insights into the complex interplay between culture, context, and mental health outcomes among adolescents from diverse backgrounds.

Considering the biopsychosocial model, which considers the complex interplay between biological, psychological, and social factors in understanding health and well-being (Wade & Halligan, 2017), the implications of our study results can be discussed through these three factors. Firstly, the observed differences in the prevalence of ACE and their association with PTSD and CPTSD suggest that biological vulnerability and response to traumatic experiences may vary across populations. It is important to explore the potential role of genetic factors, neurobiological processes, and physiological responses to stress in understanding the differential impact of ACE on mental health outcomes in adolescents.

Secondly, attachment plays a significant role in the development of PTSD and CPTSD. The higher prevalence of non-secure attachment styles in the Ugandan sample may reflect the impact of ACE on the development of attachment patterns and subsequent psychological well-being. The association between attachment styles and PTSD/CPTSD highlights the psychological mechanisms involved in trauma processing, coping strategies, and the formation of relationships in the aftermath of trauma. Individual psychological factors, such as resilience, coping skills, cognitive processes, and perceptions of others and the self, may also contribute to the observed differences in PTSD and CPTSD diagnosis between the two populations.

Thirdly, living arrangements differences between both samples, highlight the social context in which these adolescents are growing up. Cultural norms, societal support systems, and access to resources and services may influence the prevalence and impact of ACE as well as the likelihood of seeking help for mental health issues. The differences in the prevalence of ACE between the Ugandan and Indian samples may reflect variations in social and cultural contexts, including family dynamics, community support, exposure to violence, and access to healthcare and trauma-informed interventions.

Overall, these findings emphasize the importance of addressing social determinants of health and promoting supportive environments, including family, school, and community systems, to prevent and mitigate the impact of ACE and facilitate recovery from trauma.

In summary, the results of the study, when viewed through the lens of the biopsychosocial model, suggest that biological, psychological, and social factors interact and contribute to the differential prevalence and impact of ACE, attachment styles, and PTSD/CPTSD in Ugandan and Indian adolescents. Understanding these multifaceted

influences is crucial for developing targeted interventions, promoting resilience, and fostering the well-being of individuals within diverse cultural and social contexts.

Our study results suggest that ACE have a significant impact on the mental health of both Ugandan and Indian adolescents. The findings of this study are consistent with previous research that has demonstrated a strong association between ACE and the development of PTSD and CPTSD. It is clear that exposure to multiple traumatic events during childhood can have long-lasting effects on mental health outcomes, particularly in LALMIC where resources for mental health care are limited. The high prevalence of ACE in LALMIC adolescents highlights the urgent need for interventions aimed at preventing and addressing childhood trauma. These interventions should be culturally sensitive and tailored to the unique needs of the adolescents, considering the social, economic, and political context in which they live. Overall, this study underscores the importance of addressing childhood trauma as a public health priority in India and Uganda.

Conclusion

Despite these limitations, our study results contribute significantly to enhancing our understanding of the intricate association between ACE and the development of PTSD or CPTSD in adolescents from LALMIC. Both the independent and cumulative effects analysis yielded valuable insights into this relationship.

The independent effect analysis particularly sheds light on the connection between ACE and CPTSD, rather than PTSD, as interpersonal ACE demonstrated a more pronounced impact on CPTSD in both samples. On the other hand, the cumulative effect analysis appears relevant to both disorders, as lower ACE exposure had the greatest influence on the likelihood of developing PTSD in both samples, whereas higher ACE exposure heightened the probability of developing CPTSD.

Furthermore, it is noteworthy that being female exacerbates vulnerability solely in the context of PTSD development. As for the relationship between attachment styles and PTSD, the findings align with our expectations. However, future investigations exploring the connection between attachment styles and CPTSD may benefit from incorporating socio-interpersonal factors to provide a more comprehensive understanding of this phenomenon.

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