

CHILDHOOD TRAUMA AND GAMBLING DISORDER: A COMPLEX ASSOCIATION

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Candidate's Declaration

I, Natascha Simone Horak (Student number: 1639903), am a student registered for Master of Arts (MA) in Clinical Psychology in the year 2017 and 2018. I hereby declare the following:

- I confirm that ALL the work submitted for this Research Report is my own, unaided work, except where I have explicitly indicated otherwise. It is being submitted for the Degree of Master of Arts in Clinical Psychology at the University of Witwatersrand, Johannesburg. It has not been submitted for any other degree or examination at any other University.
- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
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Abstract

Background: Exposure to trauma during childhood is associated with mental illness in adulthood. Numerous studies have demonstrated an increased rate of self-reported childhood trauma in substance-abusing individuals. However, there is a limited amount of research investigating whether similar links are present in behavioural addictions such as gambling disorder (GD). There is an association between childhood trauma and GD, but further research is needed to elucidate this seemingly complex association. The way in which stressful life events influence the relationship between childhood trauma and GD is also not clear.

Method: Thirty-one patients with GD and 31 age- and gender-matched healthy controls from the Western Cape, South Africa, completed the Childhood Trauma Questionnaire (CTQ-SF) to assess the nature (i.e. subtypes) and severity of self-reported childhood trauma. Past 12-month stressful life events were measured using the Life Event Stress Scale (LESS). It was hypothesized that childhood trauma, particularly emotional neglect and physical neglect, would be significant predictors of group membership (i.e. the presence of a primary diagnosis of GD) and GD severity. It was further postulated that stressful life events would moderate the relationship between childhood trauma and GD.

Results: Severity of self-reported childhood trauma in general, as well as its five subtypes, was significantly higher in GD patients compared to healthy controls (ranging from $p < .001$ to $p = .033$). Self-reported childhood trauma was a significant predictor of a diagnosis of GD ($OR = 1.22$, 95% CI [1.09, 1.37], $p = .001$). However, no significant association was found between childhood trauma and GD severity. Of the five subtypes of childhood trauma, physical neglect was the only significant predictor of a diagnosis of GD ($OR = 1.88$, 95% CI [1.08, 3.27], $p = .025$). Results further suggested that stressful life events act as a moderator of the relationship between childhood trauma and the presence of GD ($F(1,25) = 7.082$, $p = .01$). High levels of stressful life events in the past 12 months increased the likelihood of a diagnosis of GD, independent of the severity of childhood trauma experienced.

Conclusion: There seems to be a strong association between childhood trauma and GD. Neglect in childhood may have a stronger influence on the development of GD than other subtypes of childhood trauma and therefore warrants further investigation. The association between childhood trauma and GD appears to be influenced by recent stressful life events in that high levels of stress increase the likelihood of GD, independent of the severity of childhood trauma. Results highlight the importance of an integrated treatment approach which considers (childhood) trauma, but also current stress in the context of GD.

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Chapter 1: Introduction

1.1 Rationale

Exposure to trauma during childhood can have a severe impact on the affected individual's life and in many instances is associated with the development of mental illness at the time of adversity and/or in later life (Barrett et al., 2015; Edwards, Holden, Felitti, & Anda, 2003; Heim & Nemeroff, 2001; Hughes, Lowey, Quigg, & Bellis, 2016; Lochner et al., 2002, 2010; Nemeroff, 2016; Palmisano, Innamorati, & Vanderlinden, 2016; Polusny & Follette, 1995; Stein et al., 1996; Walker et al., 1992; Widom, DuMont, & Czaja, 2007). An increased rate of childhood trauma has been reported by patients with addictive disorders, particularly in substance-abusing populations (Colman et al., 2013; Cuomo et al., 2008; Dolan & Whitworth, 2013; Duncan, 2005; Enoch et al., 2010; Farrugia et al., 2011; Hawkins, Catalano, & Miller, 1992; Jewkes, Dunkle, Nduna, Jama, & Puren, 2010; Kendler et al., 2000; Lopez-Patton et al., 2015; Meade et al., 2012). However, there is a limited amount of research investigating whether similar links are present in behavioural addictions such as gambling disorder (GD). GD is characterized by the inability to control the urge to gamble despite serious social and personal consequences (American Psychiatric Association, 2013a). Although it is a prevalent and debilitating mental disorder (Sinclair, Pasche, Pretorius, & Stein, 2014), there is a paucity of research on GD, particularly regarding potential risk and protective factors.

One vulnerability factor for the development of GD may be childhood trauma. There seems to be evidence to suggest a link between the experience of childhood trauma and GD (Black, Shaw, McCormick, & Allen, 2012; Dion, Collin-Vézina, De La Sablonnière, Philippe-Labbé, & Giffard, 2010; Felsher, Derevensky, & Gupta, 2010; Hodgins et al., 2010, 2012; Kausch, Rugle, & Rowland, 2006; McCormick, Delfabbro, & Denson, 2012; Nixon et al., 2012; Petry & Steinberg, 2005; Scherrer et al., 2007). This link is likely to be more complex than previously assumed. Firstly, it is possible that survivors of childhood trauma engage in compulsive gambling behaviour as a coping mechanism, entailing escapism from reliving the traumatic event/s or associated distressing symptoms (Hodgins et al., 2010; Imperatori et al., 2015; Jacobs, 1986; Langewisch, 2005). Secondly, continuous risky gambling behaviour may worsen pre-existing symptoms of trauma or even place individuals at risk of re-traumatization (Hodgins et al., 2010). Specific types of trauma experienced during childhood could also have varying degrees of impact on the development of behavioural addictions such as GD (Dalbudak, Evren, Aldemir, & Evren, 2014; McPherson, Clayton, Wood, Hiskey, & Andrews,

2013). For example, childhood emotional abuse (but not physical or sexual abuse) was found to be associated with sexual compulsivity in adulthood (McPherson et al., 2013). In participants with GD, emotional neglect and physical neglect emerged as the most frequently endorsed type of childhood trauma, independent of trauma severity (Felsher et al., 2010).

In line with the idea of a complex association between trauma (including childhood trauma) and GD, factors potentially influencing this relationship should be explored. While a diagnosis of posttraumatic stress disorder (PTSD) has been most commonly researched as a stressor associated with GD, it is possible that stressful life events such as death of a family member, divorce or job loss may also play a role in moderating the relationship between childhood trauma and GD (Hammen, Henry, & Daley, 2000; Langewisch, 2005; McCormick et al., 2012; McLaughlin, Conron, Koenen, & Gilman, 2010; Storr, Lee, Derevensky, Ialongo, & Martins, 2012). Therefore, an investigation of aspects of life stress as possibly moderating the link between childhood trauma and GD may help researchers to gain a deeper understanding of inter-relationships.

Despite research supporting a combined treatment approach for addiction and trauma (Dolan & Whitworth, 2013; Duncan, 2005; Rowan & Foy, 1993), few addictions treatment programs in South Africa have integrated systematic childhood trauma assessment and treatment into their protocols. In addition, recent exposure to stressful life events is seldom taken into consideration as a potential perpetuating or exacerbating factor in addiction psychopathology. Understanding the relationship between childhood trauma, current stressful event exposure and GD may assist in the development of more effective treatment protocols. It may also increase awareness of the underlying conditions or symptoms of trauma that could, in fact, be the primary cause of psychological distress.

1.2 Aims

The main aim of the study was to investigate the relationship between self-reported childhood trauma and gambling disorder in adulthood in a sample of patients from the Western Cape in South Africa. Specifically, the degree of self-reported childhood trauma was compared across two study groups: patients with GD and age- and gender-matched healthy controls¹. Moreover, it was investigated whether childhood trauma predicts group membership in study participants, i.e. whether participants with a history of self-reported childhood trauma are

¹ “Healthy controls” was the term used in the overarching research study (see 3.2 *Study Design*). This refers to a group of individuals who do not meet criteria for the disorder being investigated. Nonetheless, it is recognized that individuals in this group may have other kinds of life difficulties or issues.

more likely to belong to the GD group than the healthy control group. Another aim of the study included examining the associations between specific subtypes of childhood trauma and GD. Assuming that there is a complex association between childhood trauma and GD, stressful life events were considered as a possible moderator of this relationship. The exact research questions and hypotheses under investigation are presented in section 3.1 (see 3.1 *Research Questions*).

1.3 Structure of the research report

In order to orientate the reader, the structure of the research report is delineated in this section. Following the introductory chapter (*Chapter 1*) which includes the rationale for, and aims of, the study, a literature review of previous research pertaining to the topic is presented in *Chapter 2*. The literature review begins with a general overview of the prevalence of childhood trauma and its impact on mental health globally and in South Africa, followed by a discussion of past research investigating childhood trauma in addictions. Subsequently, the review then specifically focuses on studies examining the association between childhood trauma and GD. This is followed by an illustration of past research that has explored factors potentially influencing the relationship between childhood trauma and GD. In particular, recent stressful life event exposure is considered as one potential factor that may impact this association. Research highlighting the importance of combined treatment approaches for trauma and addiction is also presented and discussed. In the *Method* chapter (*Chapter 3*), the research questions and hypotheses under investigation are presented, followed by the study design, sampling procedures and method of data collection, including a description of all the measures (i.e. scales and interviews) implemented in the study. Thereafter, data analysis methods are described and ethical considerations relating to this study are briefly outlined. Study results are presented in *Chapter 4*, including descriptive statistics and the results of hypothesis testing. A discussion of the study findings follows in *Chapter 5*. The discussion is organized based on findings for each hypothesis, and in addition, includes a section in which study strengths and limitations are critically discussed. In ending, core conclusions of this study are highlighted and suggestions for future research and clinical practice applications are made.

Chapter 2: Literature Review

Children and adolescents may be exposed to various types of maltreatment and traumatic stress (Carr, Martins, Stingel, Lemgruber, & Juruena, 2013; Pynoos, Steinberg, & Goenjian, 1996). For the purpose of this study, the types of traumatic experiences which are considered to constitute ‘childhood trauma’ include physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect or combinations of these. Physical abuse is defined as the intentional act of a person committed upon another by physical contact and intending to cause physical pain or injury (Malinosky-Rummell & Hansen, 1993). Sexual abuse is defined as the use of force or manipulation to engage an individual in unwanted sexual behaviour without his or her consent (National Sexual Violence Resource Center, 2010). Emotional abuse is understood to constitute any act including isolation, confinement, verbal assault, intimidation, humiliation, infantilization or any other treatment which may reduce an individual’s sense of self-worth, identity and dignity (Tracy, 2016). Physical neglect is characterized by persistent failure of the caregiver to meet the child’s basic physical needs, such as the failure to provide adequate nutrition, clothing, health care, supervision and shelter, resulting in impairment of physical health or development (Turney & Tanner, 2005). Emotional neglect can be defined as the persistent failure of the caregiver to meet the child’s basic emotional needs, such as the failure to provide love, attention, protection, care and support, resulting in impairment of mental health or emotional development (Turney & Tanner, 2005). Although experiences such as natural disasters, accidents, illness or injury, and school or community violence can certainly constitute traumatic events that children and adolescents may be exposed to, these are not included in the working definition for childhood trauma in this study. This is in part because, as will be elaborated further, the research relating to childhood trauma exposure and possible links to addictive disorders tends to relate to trauma taking place in the caregiving or home environment and generally over a prolonged period of time.

2.1 Global and national prevalence of childhood trauma

According to the World Health Organization (WHO), on a global scale approximately 25% of adults report that they have experienced physical abuse in their childhood (World Health Organization, 2017). In this WHO report, children around the globe reported suffering from various forms of trauma: 18% of girls and 8% of boys reported sexual abuse, 23% physical abuse, 36% emotional abuse, and 16% physical neglect (World Health Organization, 2017). The percentages of individuals aged 18-24 years who experienced physical violence before

they were 18 years old range from 22% to 76% on the African continent (findings generated from countries participating in the “Data from Violence Against Children Surveys”, including Zimbabwe, Malawi, Nigeria, Kenya, Tanzania and Swaziland). While South African data was not included in this study, it is plausible to hypothesize that rates in this country would likely fall within the same broad parameters of exposure rates.

According to the Children’s Bureau of the U.S. Department of Health and Human Services, approximately 700,000 substantiated cases of child maltreatment were reported annually between 2007 and 2014 in the United States (Child Trends DataBank, 2016). Reported rates of neglect were higher than those for other types of childhood trauma. In 2014, 7.1 per thousand children were reported victims of neglect, whereas 1.6 per thousand children were reported victims of physical abuse, 0.8 of sexual abuse and 0.6 of emotional abuse (Child Trends DataBank, 2016). In South Africa, results from the Optimus Study on Child Abuse, Violence and Neglect ($N = 9730$) indicate that more than one third of (34%) of the adolescent participants reported having been hit, beaten, kicked or physically hurt at some point by an adult supposedly taking care of them (The Centre for Justice and Crime Prevention, 2015). Approximately one fifth of participants reported experiencing neglect (21%) or sexual abuse (20%), and approximately 16% reportedly experienced emotional abuse in their lifetimes (The Centre for Justice and Crime Prevention, 2015). It is interesting to note that these figures are generally comparable with the WHO findings, although emotional abuse figures are lower and the neglect and sexual abuse figures are slightly higher in the South African population. As is evident, childhood trauma is alarmingly prevalent globally (World Health Organization, 2017) and in South Africa in particular (Kaminer & Eagle, 2010), and presents great cause for concern on multiple levels, including its potential immediate and longer term consequences. For example, victims of childhood trauma can suffer serious injuries, in some cases resulting in death. Approximately 41,000 children under the age of 15 are victims of homicide annually (World Health Organization, 2017). Experiencing trauma in childhood also places individuals at a higher risk of becoming a perpetrator or victim of violence, and of high-risk sexual behaviours, obesity, and various mental disorders in adulthood (World Health Organization, 2017), as will be discussed further in section 2.2 below (see 2.2 *Impact of childhood trauma on mental health*).

Past research on childhood maltreatment has focused strongly on abuse as opposed to neglect, despite some evidence indicating that neglect may be the most commonly experienced type of childhood trauma (Child Trends DataBank, 2016; Hildyard & Wolfe, 2002). In their review of

studies investigating child neglect, Hildyard and Wolfe (2002) concluded that child neglect can have severe, harmful short- and long-term effects on children's socio-emotional, cognitive and behavioural development. Importantly, they emphasized that the effects associated with neglect are different from those associated with physical abuse. Compared to children who experienced physical abuse, neglected children have more severe cognitive and academic deficits, limited peer interactions, a tendency to withdraw socially, and a propensity towards internalizing (as opposed to externalizing) problems (Hildyard & Wolfe, 2002). Internalizing problems include difficulties with emotion regulation, which has been shown to be associated with addictions (e.g. Li & Sinha, 2008). Findings from a meta-analytic review of studies published on child neglect between 1980 and 2008 with almost 60,000 participants showed that the overall self-reported prevalence was approximately 16% for the set of physical neglect studies and approximately 18% for the emotional neglect studies (Stoltenborgh, Bakermans-Kranenburg, & Van Ijzendoorn, 2013). The authors concluded that despite disturbingly high prevalence rates of child neglect there is a paucity of scientific research on the topic, particularly in low resource countries (Stoltenborgh et al., 2013). These results highlight the importance of extending research on trauma to include neglect alongside the more 'active' abuse-related categories of sexual and physical abuse, and also to extending research to more poorly resourced countries, such as South Africa.

2.2 Impact of childhood trauma on mental health

The experience of childhood trauma may have a strong negative influence on the psychological wellbeing of affected individuals, not only in childhood and adolescence but also in adulthood. For example, in a large U.S. study that tested 8667 adult members of a health maintenance organization, lower mean mental health scores were associated with higher numbers of childhood abuse categories (Edwards et al., 2003). The study demonstrated a dose-response relationship between the number of types of childhood trauma reported and mental health scores. Of the participants who reported any type of childhood trauma, approximately 35% reported multiple types of childhood trauma (Edwards et al., 2003).

Numerous studies have established that exposure to childhood trauma is associated with a variety of mental disorders (Heim & Nemeroff, 2001; Kessler et al., 2012; Lochner et al., 2002, 2010; Nemeroff, 2016; Palmisano et al., 2016; Polusny & Follette, 1995; Walker et al., 1992; Widom et al., 2007). For example, in a large Australian census sample ($N = 8841$), Barrett et al. (2015) found that more than half (53%) of the participants who reported childhood trauma met the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-

TR; American Psychiatric Association 2000) criteria for lifetime mood, anxiety or substance use disorders, compared with only 24% of those without a trauma history. Highest prevalence rates were found for alcohol use disorder (29%), major depressive disorder (21%) and posttraumatic stress disorder (PTSD) (13%). The odds of meeting diagnostic criteria for a mental disorder were 3.6 times higher in participants who reported childhood trauma than those without such a history (Barrett et al., 2015). Read, Van Os, Morrison and Ross (2005) conducted a review of over 40 studies which investigated the prevalence of childhood abuse among psychiatric patients. Overall, about two-thirds (69%) of female psychiatric patients and approximately 60% of male psychiatric patients reported a history of exposure to either childhood *sexual or physical abuse* (Read, Van Os, Morrison, & Ross, 2005). In a U.S. population-based twin study with 1411 women, results showed a positive association between self-reported childhood *sexual abuse* and a range of mental disorders (Kendler et al., 2000). Of the six disorders investigated, alcohol and drug dependence had the highest odds ratios (OR) in relation to childhood *sexual abuse*; survivors of childhood *sexual abuse* were approximately three times more likely to meet criteria for drug dependence and 2.8 times more likely to meet criteria for alcohol dependence than those without a history of childhood *sexual abuse* (Kendler et al., 2000). Several studies on childhood trauma have focused on its association with specific categories of mental disorders. For example, Heim and Nemeroff (2001) summarized findings from various studies showing that children exposed to early adverse experiences are at increased risk for the development of depression, anxiety, or both. Colman et al. (2013) investigated the association between stress, depression, alcohol use and childhood trauma in a population-based Canadian cohort ($N = 3930$). They found that childhood trauma significantly increased the odds of becoming depressed (following 1 event: $OR = 1.66$; 2+ events, $OR = 3.89$) and drinking heavily (2+ events: $OR = 1.79$). Numerous studies have demonstrated a strong association between childhood trauma and PTSD in adulthood (e.g. Brockie et al., 2015; Cloitre et al., 2009; Fetzner, McMillan, Sareen, & Asmundson, 2011; Kaminer, Grimsrud, Myer, Stein, & Williams, 2008). Additionally, there also appears to be an association between childhood trauma, PTSD and substance use disorders. In a study by Farrugia et al. (2011), participants with comorbid PTSD and substance use disorders were grouped into those who had a history of childhood trauma and those who had only experienced trauma during adulthood. Compared to participants with a history of adult trauma, participants with a history of childhood trauma had a significantly longer duration of PTSD. In addition, participants with childhood trauma reported first intoxication at an earlier age, more extensive exposure to lifetime trauma and more severe

substance use than participants with adult trauma (Farrugia et al., 2011). These findings are consistent with earlier research showing that individuals with childhood trauma demonstrate greater psychiatric symptom severity than individuals who experience trauma in adulthood only (e.g. Cloitre et al., 2009; Kaysen, Resick, & Wise, 2003; McCauley, 1997).

2.3 Childhood trauma and mental health impact in South Africa

Though there is a paucity of research on experiences of childhood trauma in South Africa, a few studies have investigated its clinical correlates as is elaborated here. In a nationally representative sample ($N = 4351$) from the South African Stress and Health (SASH) Study (Williams et al., 2008) men who reported childhood *physical abuse* were more than four times more likely to have a lifetime diagnosis of PTSD than men without a history of childhood *physical abuse*. However, this association was not observed in female participants (Kaminer et al., 2008). Lochner et al. (2002) found a significantly greater severity of childhood trauma in female patients with obsessive-compulsive disorder (OCD) and trichotillomania (TTM) compared with healthy controls ($N = 141$). Specifically, OCD and TTM patients reported experiencing significantly more *emotional neglect* than controls. In a combined sample of Swedish and South African patients with social anxiety disorder or panic disorder ($N = 220$), childhood *emotional abuse* was found to be a significant predictor of social anxiety disorder and panic disorder in adulthood (Lochner et al., 2010). Notably, patients from South Africa also demonstrated higher levels of childhood trauma than Swedish patients (Lochner et al., 2010), suggesting that exposure to childhood trauma may differ across countries. Results from a large study ($N = 3328$) conducted in a township in Cape Town, South Africa, showed that methamphetamine users were more likely than non-users to report a history of *sexual and/or physical abuse* in their childhood (Meade et al., 2012). In rural South African youth ($N = 2782$), childhood trauma was also found to be associated with substance use (Jewkes et al., 2010). Women who had experienced *emotional neglect* during childhood were about 2.2 times more likely to abuse alcohol, whereas men with childhood *emotional neglect* were about twice as likely to use drugs compared to youth without a history of trauma. In that study, childhood *sexual abuse* was associated with alcohol abuse in both men (OR = 3.68) and women (OR = 3.94) (Jewkes et al., 2010). In order to examine the specific association between childhood trauma and gambling disorder (GD) as the main aim of this study, associations between childhood trauma and addictions in general will first be discussed before moving on to look at findings with regard to GD in particular.

2.4 Childhood trauma and addictions

The results discussed in the previous two sub-sections suggest a strong link between childhood trauma and, amongst others, addictions, and are consistent with findings of increased rates of self-reported childhood trauma in patients with substance use disorders (Colman et al., 2013; Cuomo et al., 2008; Dolan & Whitworth, 2013; Duncan, 2005; Duncan, Saunders, Kilpatrick, Hanson, & Resnick, 1996; Farrugia et al., 2011; Hawkins et al., 1992; Jewkes et al., 2010; Kendler et al., 2000; Lopez-Patton et al., 2015; Meade et al., 2012). In recent research in the field of addiction, many similarities between substance use disorders and so-called ‘behavioural addictions’ such as sexual compulsivity and internet addiction have been identified. One such similarity appears to be an increased rate of childhood trauma in both patients with substance use disorders and patients with behavioural addictions. For example, McPherson et al. (2013) investigated how various childhood experiences may be related to the development of sexual compulsivity in 348 addictions support website users. Interestingly, childhood *emotional abuse* was found to be associated with sexual compulsivity, whereas childhood physical or sexual abuse showed no association with sexual compulsivity (McPherson et al., 2013). It is also noteworthy that *emotional abuse* during childhood was also the strongest predictor of risk level for internet addiction in a Turkish student sample ($N = 271$) (Dalbudak et al., 2014).

These findings suggest that certain types of trauma may be stronger predictors of the development of a behavioural addiction than others. The evidence to date, based on a rather limited body of research, suggests that *emotional abuse* and *emotional neglect* may have stronger associations with behavioural addictions than other types of trauma. Further investigation of different types of trauma and their varying degrees of impact on the various behavioural addictions is warranted.

2.5 Childhood trauma and gambling disorder (GD)

Gambling disorder (GD) is a behavioural addiction which has received increased attention in research in recent years. Though not without controversy, GD was included into the category of ‘substance-related and other addictive disorders’ in the DSM-5 (American Psychiatric Association, 2013a) due to increasing evidence of a similar reward system activation in the brain in both substance use disorders and GD, as well as the genetic and phenotypic resemblance of GD patient profiles to those of substance use disorder patients (American Psychiatric Association, 2013b). GD can be defined as the inability to control the urge to

gamble, despite severely negative social and personal consequences (American Psychiatric Association, 2013a). According to the DSM-5 (American Psychiatric Association, 2013a), an individual must meet at least four of the nine specified criteria in order to be diagnosed with GD (also referred to as ‘gambling addiction’ in the general public), whereas ‘problem gamblers’ are generally understood to be those individuals meeting no more than three criteria for GD (e.g. Wong & So, 2003). Approximately 5% of the South African population are considered to be problem gamblers, with about 1% of regular gamblers meeting the criteria for GD (National Centre for the Study of Gambling, 2006). Individuals with GD are typically pre-occupied with thoughts about gambling, may continually chase bets, conceal their behaviour, tell lies about where they go, how much they spend or owe, accumulate debt, and/or, in some cases, even resort to fraud or theft in order to continue gambling (American Psychiatric Association, 2013a). Such behaviours can be severely debilitating and can contribute to relational and occupational problems. It can be argued that some of the behaviours typical of GD bear a strong resemblance with symptoms of substance use disorders; for example, continuous engagement in addictive behaviour despite negative consequences, pre-occupation, tolerance, withdrawal and repeated attempts to cut back or stop. Since there is a considerable amount of evidence suggesting a link between childhood trauma and substance use disorders (e.g. Cuomo et al., 2008; Duncan et al., 1996; Lopez-Patton et al., 2015), as well as findings that childhood trauma is associated with the development of other behavioural addictions (Dalbudak et al., 2014; McPherson et al., 2013), it can be hypothesized that there may be a relationship between childhood trauma and GD.

In fact, evidence of a link between childhood trauma and GD is emerging. Petry and Steinberg (2005) investigated childhood trauma histories in a group of treatment-seeking GD patients ($N = 149$). Childhood trauma was measured using the short form of the Childhood Trauma Questionnaire (CTQ-SF; Bernstein et al., 2003) which consists of five subscales, i.e. *physical abuse*, *sexual abuse*, *emotional abuse*, *physical neglect* and *emotional neglect*, respectively summed to form a total score to reflect the overall severity of childhood trauma. Gambling histories, as well as the severity of gambling problems, were assessed by means of the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987). In this study, it was found that the severity of childhood trauma was significantly associated with increased severity of gambling problems and lower age of gambling onset. Results suggested a high prevalence of childhood trauma in GD patients, especially in female gamblers. Similarly, in a group of 111 patients admitted to a gambling treatment program for veterans in Ohio (U.S.A.), trauma histories were determined using the family/social section of the Addiction Severity Index

(McLellan et al., 1992) with items such as, “Did any of these people [e.g. family members, friends] abuse you emotionally (make you feel bad through harsh words)?”. Sixty-four percent of GD patients reported a history of *emotional trauma*, 41% reported *physical trauma*, and 24% reported *sexual trauma* (Kausch et al., 2006). A history of trauma was also associated with higher scores of psychiatric distress in this cohort (Kausch et al., 2006). However, it should be noted that although the majority of the reported trauma occurred in childhood, some of these GD patients reported experiences of trauma in adulthood as well. Furthermore, the study sample was highly specific (only veterans, 92% of them male), which limits generalizability to the larger gambling population.

In a comparatively larger study, computer-assisted telephone interviews, which included the Diagnostic Interview Schedule (DIS-III-R; Robins, Helzer, Cottler, & Goldring, 1988), were conducted with 1672 male twins from the Vietnam Era Twin Registry to investigate the association between lifetime traumatic event exposure and gambling problems (Scherrer et al., 2007). Genetic factors, family environmental influences and psychiatric disorders were considered as potential covariates. The authors examined potential associations between each traumatic event and three levels of problem gambling (at risk: 1–2 symptoms; problem gambling: 3–4 symptoms; pathological gambling: 5 or more symptoms). Lifetime traumatic events included experiences such as a life-threatening accident, a natural disaster, rape, serious physical assault, physical abuse as a child and serious neglect as a child. After adjusting for covariates, *child neglect* (relative risk [RR] = 5.53), *child abuse* (RR = 2.31), witnessing someone being killed or badly hurt (RR = 2.83) and physical assault (RR = 3.39) were associated with pathological gambling. However, genetic and family environmental factors made a significant contribution to the association between exposure to traumatic events and one or more symptoms of problem gambling (Scherrer et al., 2007). Therefore, although a significant association was found between childhood traumatic event exposure and problem or pathological gambling, the relationship was partially accounted for by other psychiatric disorders and genetic and family environmental factors. These findings highlight the complexity of the association between childhood trauma and GD.

In a five-year longitudinal study of gambling involvement, a significant association between childhood maltreatment and gambling problems was found in a Canadian community sample of men and women ($N = 1372$), with problem gamblers reporting more childhood maltreatment than non-problem gamblers (Hodgins et al., 2010). Further, childhood maltreatment was a significant predictor of the severity and frequency of gambling problems,

even after controlling for substance use disorders, family environment, psychological distress, and symptoms of antisocial personality disorder (Hodgins et al., 2010). Various measures relating to gambling were utilized, as well as the CTQ-SF to assess childhood trauma. In a later publication, Hodgins et al. (2012) identified childhood maltreatment as a risk factor for the development of GD among high-frequency gamblers. Evidence for a link between childhood sexual abuse and pathological gambling was also found in Canadian Aboriginal communities (Dion et al., 2010). However, the authors cautioned against inferring a causal relationship and also emphasized the complexity of the proposed link. Similarly, a significant association between childhood sexual abuse and pathological gambling was shown among Greenland Inuit women (Larsen, Curtis, & Bjerregaard, 2013). It should be noted that the specificity of these two study samples limits the generalizability of the results to the global population.

Felsher, Derevensky and Gupta (2010) explored the relationship between multiple types of childhood trauma and gambling severity in a sample of adolescents and young adults ($N = 1324$; ages ranging from 17-22 years). Study participants were grouped into four categories based on their gambling severity using DSM-IV criteria for pathological gambling: Non-gambler (no gambling during the past year), social gambler (DSM score 0–2), at-risk gambler (DSM score 3–4), and pathological gambler (DSM score ≥ 5). Notably, 72% of the participants were classified as social gamblers and only 2% met criteria for pathological gambling (i.e. GD). Types of childhood trauma were assessed with the subscales of the CTQ-SF (Bernstein et al., 2003). Overall, of those participants that reported experiencing any type of childhood trauma, *emotional neglect* was the most commonly experienced form of childhood trauma (Felsher et al., 2010). In participants with GD, *emotional neglect* and *physical neglect* emerged as the most frequently endorsed type of childhood trauma, independent of trauma severity. A severe history of childhood trauma was significantly more likely to be reported by at-risk and pathological gamblers than non-gamblers and social gamblers, independent of trauma type (Felsher et al., 2010). The authors concluded that childhood trauma may be a risk factor in the development of GD. One limitation of this particular study is that only 2% of the sample met criteria for GD, limiting the comparability of these results with other studies on childhood trauma in GD.

In a smaller study comparing childhood trauma histories of 95 pathological gamblers with 91 healthy controls in Iowa (U.S.A.) using the Revised Childhood Experiences Questionnaire (CEQ-R; Zanarini, 1992), results showed that individuals with GD were significantly more

likely than controls to report any type of childhood trauma and to report multiple types of trauma (Black et al., 2012). Moreover, severity of gambling was positively associated with childhood trauma (Black et al., 2012). The most prevalent types of childhood abuse found in the GD patient group were *verbal abuse* (48%) and *emotional abuse* (40%) (Black et al., 2012). Nixon et al. (2012) utilized an interpretative phenomenological analysis to explore the relationship between trauma and the development of problem and pathological gambling in six women who reported suffering from trauma and having a gambling problem. The authors concluded that the experience of childhood trauma impacted their participants' sense of self (i.e. instilling the belief that they were 'not good enough'), which in turn led to the development and perpetuation of problem and pathological gambling in order to escape from these traumatic memories (Nixon et al., 2012).

2.6 Factors influencing the relationship between childhood trauma and GD

In the past few years, researchers examining the relationship between childhood trauma and GD have become increasingly aware of the complexity of the association. Consequently, they have begun to investigate the factors that may influence this relationship. For example, McCormick, Delfabbro and Denson (2012) conducted an empirical investigation of the validity of Jacobs' General Theory of Addictions in relation to GD. In essence, this theory suggests that experiences of inadequacy and negative affect in childhood may lead an individual to seek ways of reducing (the impact of) these aversive stimuli. Therefore, excessive gambling likely serves as an emotional escape from feelings of inadequacy and negative mood, primarily via the effects of dissociation (Jacobs, 1986). McCormick et al. (2012) examined possible relationships between childhood trauma, psychological and physiological vulnerability, dissociative experiences, substance use and problem gambling, in a community sample of gamblers from Australia who regularly used electronic gaming machines ($N = 190$). Problem gamblers (42% of the total sample) were found to be significantly more depressed and anxious and more likely to report childhood trauma, stressful life experiences, and higher levels of substance use. Moreover, results revealed an indirect pathway between psychological vulnerability, dissociative-like experiences (i.e. escape from reality), and problem gambling. Approximately 25% of problem gamblers reported going into a trance frequently or always, whereas only 4% of moderate risk gamblers indicated experiencing trance-like states (McCormick et al., 2012). In another study examining dissociation in casino gamblers ($N = 171$), the relationship between childhood trauma (CTQ-SF; Bernstein et al., 2003) and gambling severity (SOGS; Lesieur & Blume,

1987) was fully mediated by pathological dissociation scores (Dissociative Experiences Scale-Taxon; Waller, Putnam, & Carlson, 1996) (Imperator et al., 2015). Gambling severity was associated with both childhood trauma and pathological dissociation in casino gamblers. Findings from these two studies suggest a complex association between traumatic childhood experiences and GD in that both stressful life experiences and pathological dissociation appear to influence this relationship.

In a recent systematic review of childhood maltreatment and problem gambling by Lane et al. (2016), results confirmed a significant association between childhood trauma and GD. Another key finding was that this association no longer remained in some studies in which multivariable analyses (adjusting for psychiatric comorbidity such as PTSD, mood and anxiety disorders) were conducted (Lane et al., 2016). Conversely, other studies found an association between childhood trauma and GD that remained even after controlling for symptoms of commonly comorbid mental disorders such as substance use disorders, major depression, and antisocial personality disorder (Hodgins et al., 2010; Petry & Steinberg, 2005).

It is evident that there is a complex relationship between trauma and addiction. Not only are there increased rates of trauma in patients with addictive disorders, but the two conditions also appear to have a bidirectional influence on each other. For example, symptoms of PTSD can affect gambling behaviour (Ledgerwood & Petry, 2006). Some studies report an association between symptoms of PTSD and severity of addiction (Back et al., 2000; Hodgins, Mansley, & Thygesen, 2006; Ledgerwood & Petry, 2006). While PTSD has been most commonly researched as a stressor impacting GD, it is possible that other forms of stressful life events may also play a role in moderating the relationship between childhood trauma and GD.

In fact, there is some evidence to suggest that stress may have a stronger impact on individuals with a history of childhood trauma than those without such a history. According to the stress sensitization model, individuals who have been exposed to childhood trauma have a lower stress tolerance in later life, which may render these individuals more prone to developing a mental illness in response to stressful life events than those who have not experienced childhood trauma (Hammen et al., 2000). Specifically, Hammen et al. (2000) found that the risk for major depression in adulthood following stressful life events was increased in participants with a history of childhood trauma compared to participants who had not been exposed to trauma in childhood. They concluded that the experience of childhood

trauma can “sensitize” affected individuals to mental disorders by decreasing their tolerance towards minor stressors (Hammen et al., 2000). Biological studies have provided evidence in support of the stress sensitization model (e.g. Heim et al., 2000). McLaughlin, Conron, Koenen and Gilman (2010) also examined the validity of the stress sensitization model using data from the U.S. National Epidemiological Survey of Alcohol and Related Conditions (NESARC) ($N = 34,653$). They found that past 12-month stressful life events significantly increased the risk of PTSD, depression, anxiety disorders, and perceived stress in their study sample. Notably, the number of adverse childhood experiences influenced the magnitude of the increased risk of these mental disorders (McLaughlin et al., 2010). In other words, in participants with a history of childhood adversity, there was an increased vulnerability to mental disorders occurring after stressful life events in adulthood, compared to those participants without such a history.

In addition to a possible association between childhood trauma and the management of adult stressful life events, some research suggests a link between problem gambling and stressful life events (Bergevin, Gupta, Derevensky, & Kaufman, 2006; Elman, Tschibelu, & Borsook, 2010). For these reasons, a closer examination of the influence of stressful life events in the context of childhood trauma and GD appears warranted. The construct of ‘stressful life events’ can be defined in different ways. In this study, stressful life events constitute events that necessitate socially adaptive responses from the affected individual (Rabkin & Struening, 1976). According to Holmes and Rahe (1967), examples of such events include (but are not limited to) death of the spouse, divorce, marital separation, serving a jail term, death of a close family member, personal injury or illness, and being dismissed from work. It should also be noted that the same construct has sometimes been referred to as ‘adverse life events’ or ‘negative life events’ in previous research.

A few studies have examined the potential impact of stressful life events in relation to GD. In a study of gambling involvement with 2156 high school learners from Ontario, Canada, problem gamblers reported more negative life events than both social gamblers and non-gamblers (Bergevin et al., 2006). Further, problem gamblers reported a greater number of *major* negative life events than the social gambling and non-gambling groups, while the number of minor negative life events did not differ significantly between groups (Bergevin et al., 2006). Storr, Lee, Derevensky, Ialongo and Martins (2012) explored the relationship between adverse life events and gambling in a U.S. sample of urban adolescents (who were predominantly African-American) ($N = 515$). Results showed that the experience of a

stressful life event in the past year (yes/no) per se did not significantly increase the odds of being a problem gambler or the frequency of gambling. However, when considering the type of stressful life event their participants had been exposed to, there was a significant association between directly (personally) experiencing threatening and violent types of events and gambling frequency ($OR > 2$, $p = .034$) (Storr et al., 2012). Further, as the number of events experienced increased, the probability of being classified as a gambler increased ($aOR = 1.07$, 95% CI [1.01, 1.13], $p = 0.013$) (Storr et al., 2012). Moreover, there appears to be a link between facing routine daily stressors and sudden gambling urges in adults with GD (Elman et al., 2010). As other studies on addictive disorders have shown, stress (and particularly recent stressful life events) can act as ‘triggers’ for relapse to the substance of choice (Brady & Sonne, 1999; Shaham, Erb, & Stewart, 2000; Stewart, 2000). Therefore, it seems important to consider both the roles of childhood trauma and stressful life events in the development and perpetuation of GD.

2.7 Integrated treatment of trauma and addiction

The results of the studies discussed in the previous sections are in accordance with other work which has provided evidence for the importance of considering the role of life trauma in addictions (Black et al., 2012; Hodgins et al., 2010; Najavits et al., 1998). Duncan (2005) has been advocating for the integration of childhood sexual abuse trauma treatment into substance abuse treatment programs in the U.S.A. for several years. She argues that the integrated treatment of substance use and childhood trauma has been shown to decrease the risk of relapse (Rowan & Foy, 1993). Conversely, the treatment of substance abuse in women exposed to childhood sexual abuse decreases the risk for future victimization (Duncan, 2005). Despite these and other studies (e.g. McCormick et al., 2012) indicating the benefit of an integrated treatment approach, those who administer addictions treatment programs have only recently begun to recognize their role in identifying and treating underlying conditions (such as those relating to trauma) in order to improve treatment outcomes. In addition, since previous research suggests links between childhood trauma and stress sensitization (Hammen et al., 2000; McLaughlin et al., 2010) and there is some evidence to suggest that current stressful life events potentially increase gambling urges (Elman et al., 2010), an assessment of recent exposure to stressful life events may help to identify ‘triggers’ for relapse to the addictive behaviour or substance of choice. Awareness of patients’ stress sensitization difficulties that may stem from historical childhood trauma may also inform treatment plans in relation to stress management. Further research on the nature of the relationship between

childhood trauma, stress and addictive disorders is needed so that targeted intervention and more effective treatment strategies can be developed. Given the paucity of research into risk factors for GD and the possibility of similar associative links between childhood trauma and the disorder as has been found in relation to other addictive disorders, it is useful to continue research in this area.

Chapter 3: Method

In the following chapter, the research questions of the study will be presented together with the hypotheses under investigation. Thereafter, the study design and sampling procedures will be explained, followed by a description of the methods utilized for data collection and analysis. In addition, ethics considerations in relation to the study design and procedures will also be discussed.

3.1 Research Questions

In line with the study rationale, aims and the review of past research literature (*Chapters 1 and 2*), the following research questions and hypotheses were developed and investigated in this study:

3.1.1 (RQ1): Do levels of childhood trauma differ between the GD and healthy control groups?

H1: Self-reported childhood trauma (Childhood Trauma Questionnaire (CTQ) Total Score) will be higher in the GD group compared to healthy controls.

H2: Self-reported childhood trauma (CTQ Total Score) will be a significant predictor of gambling severity (Yale-Brown Obsessive Compulsive Scale for pathological gambling (PG-YBOCS) score) in the GD group.

H3: Self-reported childhood trauma (CTQ Total Score) will be a significant predictor of the presence of GD.

3.1.2 (RQ2): Do specific types of trauma (emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect) have a stronger association with GD than others?

H4: All types of self-reported childhood trauma (CTQ subscales) will be higher in the GD group compared to healthy controls.

H5: Emotional neglect and physical neglect will be stronger predictors of the presence of GD than physical abuse, sexual abuse and emotional abuse.

H6: Emotional neglect and physical neglect will be stronger predictors of gambling severity (PG-YBOCS score) than physical abuse, sexual abuse and emotional abuse in the GD group.

3.1.3 (RQ3): How does past 12-month stressful life events exposure influence the relationship between childhood trauma and GD?

H7: Past 12-month stressful life events exposure (Life Event Stress Scale (LESS) score) will moderate the relationship between childhood trauma and GD.

3.2 Study Design

This research forms part of a larger ongoing cross-sectional case-control study conducted under the auspices of the MRC Unit of Anxiety and Stress Disorders at the Universities of Stellenbosch and Cape Town. The research project as a whole incorporates clinical, neurocognitive, genetics and neuroimaging components. Two groups were investigated in this sub-study, namely patients with GD and a healthy control group. In this sub-study, data was used from the clinical component of the research project. A quasi-experimental, cross-sectional design comparing scale scores across two populations was used in the sub-study. Specifically, mean scores of self-reported childhood trauma in general and five subtypes of childhood trauma were compared between the GD group and the control group, and childhood trauma and five subtypes of trauma were tested as predictors of the group membership (i.e. the presence of a primary diagnosis of GD). Childhood trauma and its subtypes were also tested as predictors of the severity of GD in the GD group. Past 12-month stressful life events exposure (as assessed by the Life Event Stress Scale (LESS)) were considered as a possible moderator of the relationship between childhood trauma and GD.

3.3 Sampling

Research participant recruitment for the overarching research project extended between November 2014 and November 2016 and took place in the Western Cape region of South Africa. Purposive sampling was used for the GD group. GD patients between the ages of 18 and 65 were recruited from the National Responsible Gambling Programme (NRGP), Ixandé House, Gamblers Anonymous meetings in Cape Town and the general public, the last mentioned via media advertisements which were placed in community newspapers (e.g. TygerBurger, People's Post, Vukani), online postings (e.g. on the South African Mental Health Information Centre's website and Facebook page, Health24) and radio broadcasts (e.g. RSG, Cape Talk). The majority of GD patients were referred to the study by Dr Heidi Sinclair, an employee of the NRGp. Dr Sinclair discussed research participation with each suitable GD patient, ensuring that potential participants understood that she would share their

identifying and contact details with the principal investigator of the study (Prof Christine Lochner). The remaining GD patients contacted the research team in response to the advertisements. Potential participants were then contacted via telephone to confirm interest in the study and to do an initial screening to confirm their suitability for participation. It should be noted that inclusion criteria for the overarching study were slightly relaxed approximately six months after study initiation in order to increase sample size. Initially, individuals with any current psychiatric comorbidity or a history of alcohol or substance abuse were excluded from the study. It was later decided to invite all individuals who reported problem or pathological gambling as their primary condition to the clinical component of the study, irrespective of psychiatric comorbidity. No incentives were offered for study participation, although travel costs were reimbursed in the form of food vouchers. Ethical considerations led to the decision to reimburse GD patients with food vouchers instead of cash since cash might have triggered gambling urges in some GD patients.

The healthy control group was sampled based on voluntary participation. Healthy controls between the ages of 18 and 65 were also recruited by means of media advertisements to attract participants from the general public and from universities in the Western Cape. In addition to the recruitment strategies mentioned above, advertisements were placed on electronic and library boards on Stellenbosch University's (SU) campuses, and details of the study were presented in a weekly newsletter to all students and staff of SU. Potential participants were contacted via telephone to confirm interest in the study and to do an initial screening to confirm their suitability for participation. As with the GD group, participants were reimbursed for their travel costs.

GD patients were either assessed at the NRGP offices, at their treatment centre, or at the MRC Unit on Anxiety and Stress Disorders (now known as the MRC Unit on Risk and Resilience in Mental Disorders) at the Tygerberg Campus of SU, depending on the participant's preference. They completed all self-report measures individually as part of the first study session after an intake interview. All healthy controls were assessed and completed self-reports individually at the MRC Unit in Tygerberg.

In total, 34 patients with GD from the Western Cape region of South Africa took part in the overarching study. After data cleaning (see *4.1 Data Cleaning*), 31 GD patients had a full dataset for the variables of interest in the sub-study. Therefore, data from the entire study sample of patients with a primary diagnosis of GD and a complete dataset ($n = 31$) was included in this sub-study. Approximately 61% of the GD patients were male and 39% were

female. GD patients' ages ranged from 22 to 68 ($M = 47.97$, $SD = 11.06$). The population distribution was as follows: 45% Coloured, 42% White, 7% Black, 3% Malay, and 3% other population group (i.e. Non-SA). For just over half of the GD sample (52%), the highest level of education was Grade 11-12. More than one third of the GD participants were either pensioners (19%) or unemployed (19%). These population demographics are not representative of the South African population as a whole. One reason for this may be that vulnerability to GD and treatment-seeking behaviour varies across different population groups and in different geographical areas. Sinclair et al. (2014) investigated the clinical profile of treatment-seeking individuals with pathological gambling in South Africa. In their sample of 200 participants with GD who had called the NRGPs' counselling hotline, their population distribution differed from that of the research population in this study: 61% were White, 18% were Black, 16% Asian and 6% Coloured (Sinclair et al., 2014). The high percentage of 'Coloured' people in the current sample is likely due to the fact that the research was conducted in the Western Cape. The age and gender profiles of the sample tend to be fairly representative of GD populations. It is noted, however, that based on these observations this study sample cannot be considered representative of the population of GD patients in South Africa in general, which may reduce the external validity of the study. However, investigating the relationship between childhood trauma and GD in this study sample may help to identify trends, which can be explored with larger, more representative study samples in future. For the purposes of the analysis, 31 healthy controls were matched to each GD patient based on gender and age.

3.4 Method of data collection

All participants were invited to the first session of the study comprising the clinical assessment and the completion of self-report measures. Age, gender, population group, level of education and employment status were assessed for the purpose of describing the study sample. Some of these variables may also have an influence on childhood trauma and/or GD. These variables (with the exception of employment status) were therefore considered as possible confounding variables in the analyses. The clinical interview lasted approximately 90 to 180 minutes with breaks in between (where necessary). The interview was conducted by research assistants with clinical experience. All interviewers were trained to use the structured interviews by means of training videotapes and workbooks, which had been developed by the designers of the study. Each interviewer observed the administration of the structured interviews by an experienced clinician prior to conducting interviews and was supervised

closely in the assignment of diagnoses. The measures used in the clinical interview are described in the sections 4.3.1 to 4.3.3 below.

3.4.1 The Structured Clinical Interview for Pathological Gambling (SCI-PG)

The Structured Clinical Interview for Pathological Gambling (SCI-PG) (Grant, Steinberg, Kim, Rounsaville, & Potenza, 2004) was conducted for diagnostic purposes with participants in the GD group. The interview is based on DSM-IV-TR criteria for pathological gambling (American Psychiatric Association, 2000). For example, participants are asked about their tendency to chase losses, “When you have lost money gambling, have you ever chased after your losses? In other words, have you ever returned to try to get even?”. Further examples of items include, amongst others, questions relating to the ability to control gambling behaviours, “Have you attempted to control your gambling by cutting back or stopping?...How successful have you been?” and regarding consequences of gambling, “Has your gambling caused problems for you in your family, work, or social life to such an extent that you lost or risked losing something or someone important?” (Grant et al., 2004). Excellent inter-rater reliability ($\kappa = 1.00$; $n = 36$; $p \leq .001$), as well as test-retest reliability ($\kappa = 1.00$; $n = 36$, $p \leq .001$), were found for the diagnosis of GD using the SCI-PG. The authors tested concurrent validity by correlating the SCI-PG with the South Oaks Gambling Screen (SOGS) measure (Lesieur & Blume, 1987) ($r = .78$; $n = 72$; $p \leq .001$). They also tested to what extent the SCI-PG correlates with gambling severity as assessed by the Yale-Brown Obsessive Compulsive Scale adapted for pathological gambling (PG-YBOCS) (Pallanti, DeCaria, Grant, Urpe, & Hollander, 2005), finding a reasonable and significant correlation ($r = .375$; $n = 72$; $p = .02$). Correlations with other psychiatric measures such as the Hamilton Anxiety Rating Scale (HAM-A) (Hamilton, 1959) and the Hamilton Depression Rating Scale (HAM-D) (Hamilton, 1960) were low ($r = .23$; $n = 72$; $p = .17$ and $r = .19$; $n = 72$; $p = .28$), indicating good discriminant validity. As such, these studies indicate excellent reliability and validity of this interview in diagnosing pathological gambling in persons with gambling problems (Grant et al., 2004). The SCI-PG has been implemented in a previous study with treatment-seeking pathological gamblers in South Africa (Sinclair et al., 2014). It is also the measure used by the NRGP in South Africa to assess whether problem gamblers calling the counselling hotline meet diagnostic criteria for GD (H. Sinclair, personal communication, 3 November 2014) and therefore seemed appropriate for use on the study population.

3.4.2 The Yale-Brown Obsessive Compulsive Scale adapted for pathological gambling (PG-YBOCS)

The Yale-Brown Obsessive Compulsive Scale adapted for pathological gambling (PG-YBOCS) (Pallanti et al., 2005) was implemented for the assessment of GD severity, as rated by a clinician. Five of the ten items measure thoughts or urges related to pathological gambling, for example, “How much of your time is occupied by urges/thoughts related to gambling and/or gambling-related activities?”, whereas the other five items assess the behavioural component of the disorder, for example, “How much do activities related to gambling interfere with your social/work (or role) functioning? Is there anything you don’t do because of them?”. Cronbach’s α was very high ($\alpha = .970$), indicating excellent internal consistency of the scale. Excellent inter-rater reliability (ICC = .970) was also found for the PG-YBOCS total score (Pallanti et al., 2005). The authors tested convergent validity by calculating Pearson’s correlation between the total PG-YBOCS change score and the SOGS (Lesieur & Blume, 1987) and found a significant correlation ($r = .895$; $n = 337$; $p = .000$). Correlations between the HAM-A (Hamilton, 1959) and the PG-YBOCS were very low and showed no statistical significance ($r = -.005$; $n = 188$; $p = .974$). Similarly, very low correlations were found between the PG-YBOCS and the HAM-D (Hamilton, 1960) ($r = .084$; $n = 188$; $p = .608$), indicating good discriminant validity of the scale (Pallanti et al., 2005). Therefore, the PG-YBOCS can be considered a reliable and valid instrument to measure the severity of pathological gambling (Pallanti et al., 2005). Sinclair et al. (2014) have used the PG-YBOCS in a South African gambling population in previous research. Additionally, the NRGP utilizes the PG-YBOCS as a measure of severity of gambling problems for South African treatment-seeking individuals using their counselling hotline (H. Sinclair, personal communication, 3 November 2014).

3.4.3 The Mini International Neuropsychiatric Interview -Version 5 (M.I.N.I.)

Although this measure will not be introduced as a variable in the present study it is useful to note the tool that was employed to assist in refining diagnosis. The Mini International Neuropsychiatric Interview Version 5 (M.I.N.I.) (Sheehan et al., 2006) was implemented in both the GD and control groups for diagnostic purposes and to exclude comorbidity and controls who appeared to have elevated levels of pathology. This version of the M.I.N.I. is based on DSM-IV diagnostic criteria for all major Axis-I disorders, such as major depression, bipolar mood disorder, generalized anxiety disorder, panic disorder, obsessive-compulsive disorder, posttraumatic stress disorder, psychotic disorders, and alcohol/substance abuse

and/or dependence. In validation studies (Sheehan et al., 1998), the interrater reliability of the M.I.N.I. ranged between good and very good ($\kappa = 0.79-1.00$; $n = 84$), depending on the diagnosis under review. Overall, the M.I.N.I. was found to have good to very good reliability and validity (Sheehan et al., 1998).

3.4.4 Inclusion into or exclusion from the study

GD patients who were included in the study met DSM-5 criteria for gambling disorder on the SCI-PG (Grant et al., 2004). That is, although the SCI-PG is based on DSM-IV criteria, a participant was diagnosed with GD if he or she met four or more criteria for GD (not five or more criteria, as was the case for a DSM-IV diagnosis of pathological gambling). It should further be noted that the criterion regarding ‘illegal acts’ was not considered as a diagnostic criterion since it was omitted entirely in the DSM-5. Please refer to *Appendix A* for all the DSM-5 diagnostic criteria of GD (see also American Psychiatric Association, 2013b). The PG-YBOCS (Pallanti et al., 2005) was used to measure severity of GD. All participants (including healthy controls) were screened for DSM IV Axis-I disorders using the M.I.N.I. (Sheehan et al., 2006). Healthy controls were only included if they did not meet criteria for any current DSM IV Axis-I disorder. After the interview, participants completed the self-report measures which are described in sections 4.3.5 to 4.3.6 below.

3.4.5 The Childhood Trauma Questionnaire - Short Form (CTQ-SF)

A short form of the Childhood Trauma Questionnaire (CTQ-SF) (Bernstein et al., 2003) was used to assess the nature and severity of childhood trauma. The CTQ-SF is a 28-item multidimensional, retrospective, self-report measure of childhood abuse and neglect experiences (see *Appendix B*). Subscales of the CTQ-SF include measures of physical abuse, emotional abuse, sexual abuse, emotional neglect and physical neglect. Each subscale consists of five items. The additional Minimization-Denial subscale, consisting of three items, assesses attempts by respondents to minimize their childhood maltreatment experiences. A 5-point Likert scale is used to indicate frequency of occurrence: (1) never true, (2) rarely true, (3) sometimes true, (4) often true, and (5) very often true. Example items include, “People in my family called me things like ‘stupid’, ‘lazy’, or ‘ugly’.” (Emotional Abuse subscale) or “I had to wear dirty clothes.” (Physical Neglect subscale; for further items, see *Appendix B*). Each subscale score ranges from 5 (no history of abuse or neglect) to 25 (very extreme history of abuse and neglect). Reliability and validity of the CTQ have been well researched (Bernstein et al., 2003; Dudeck et al., 2015; Gerdner & Allgulander, 2009; Grassi-Oliveira et al., 2014;

Spinhoven et al., 2014; Thombs, Lewis, Bernstein, Medrano, & Hatch, 2007). Most validation studies found good to very good internal consistency of the CTQ-SF for the total scale and its five subscales (Cronbach's $\alpha = .61-.95$), with the exception of the physical neglect subscale, which had barely satisfactory internal consistency in a few translated CTQ-SF versions. Since weak internal consistency for this subscale was only found in translated versions of the CTQ-SF and not in the original English version, good reliability can be assumed in this study as the questionnaires were administered in the English form. Bernstein et al. (2003) investigated criterion-related validity in a subgroup of their validation sample by comparing the CTQ-SF's latent maltreatment variables with analogous therapists' ratings of abuse and neglect. Correspondence between these two measures was precise, providing evidence for the convergent and discriminant validity of the CTQ-SF (Bernstein et al., 2003). Several of the cited studies also tested the CTQ-SF's factorial validity, confirming its five-dimensional structure. In summary, the scale appears to be a useful measure of childhood trauma. The CTQ-SF has been validated in a Brazilian sample (Grassi-Oliveira et al., 2014), which could be considered comparable with South Africa in terms of its sociodemographic context. It has also been used successfully by different research groups in South Africa (Brooks et al., 2015; Jewkes et al., 2010; Lochner et al., 2002, 2010).

3.4.6 The Life Event Stress Scale (LESS)

The Life Event Stress Scale (LESS), taken from the Social Readjustment Rating Scale (SRRS) (Holmes & Rahe, 1967), was administered to assess the number of past 12-month stressful life events to which the individual had been exposed (see *Appendix C*). Respondents are requested to mark which of the 43 listed life events they have experienced in the past 12 months. Examples of such events include (amongst others) death of a spouse, divorce, marital separation, serving a jail term, death of a close family member, personal injury or illness, marriage, job loss, retirement and pregnancy. Impact scores (i.e. weightings in terms of the anticipated 'life change') of each applicable life event in the past year are added, the final score indicating a rough estimate of the impact of stress on health. Final scores determine high (score > 300), moderate (score of 150-299) or slight (score < 150) risk of illness. Validation studies in various countries and cultures have confirmed the proposed correlation between stress scale scores and illness (Harmon, Masuda, & Holmes, 1970; Komaroff, Masuda, & Holmes, 1968; Rahe, Biersner, Ryman, & Arthur, 1972; Rahe, Mahan Jr., & Arthur, 1970). To the author's knowledge, no studies have been conducted using the SRRS or the LESS in South Africa. However, the findings of the validation studies with various

population groups in the U.S.A. (Komaroff et al., 1968) and Europe (Harmon et al., 1970) indicate the consistency of this scale in measuring stressful life events in different contexts and cultural groups. Since cross-cultural concordance is particularly important in a culturally diverse country such as South Africa, the LESS can be considered the measure of choice in assessing stressful life events. It will also be evident from the examples of items presented that the face validity of the scale is strong as the questions pertain to directly observable phenomena.

3.5 Method of data analysis

All statistical analyses were performed with IBM SPSS Statistics (Version 24) package. Providing the necessary assumptions for the statistical tests to be used were met (such as assessing skewness and kurtosis to test for the assumption of normality of the variables of interest), it was intended to use two-sample t-tests (one-tailed) to compare the total score on the CTQ, as well as scores on the five subscales, in the GD group and the control group. Pearson's product-moment correlations were used to test for a positive association between the total CTQ score and the PG-YBOCS score (=severity of GD), as well as positive associations between each CTQ subscale and the PG-YBOCS score, in the GD group.

After checking whether the assumption of a linear relationship between the above-mentioned variables had been met, the intention was to use linear regression analyses to test whether total CTQ score and the five subscale scores significantly predicted the PG-YBOCS score in the GD group. (The actual statistical calculations that were ultimately undertaken are outlined in the subsequent *Results* chapter).

Once all the assumptions for logistic regression analysis had been checked, tests were conducted to assess whether total CTQ score significantly predicted group membership, i.e. the presence of a primary diagnosis of GD (versus being classified as a healthy control). Additionally, gender, age, population group and level of education were entered into the model as possible confounding variables. Similarly, it was tested whether the five CTQ subscales were significant predictors of group membership (i.e. GD vs. healthy controls), again considering the demographic variables as possible confounders in the model.

Furthermore, LESS (past 12-month stressful life events) scores were subsequently included in the analyses to test whether stress exposure might moderate the relationship between total CTQ score and the presence of GD. This analysis was conducted by means of a two-way analysis of variance (ANOVA). Prior to the moderation analysis, it was assessed whether

there were significant associations between the total CTQ score, LESS score and group membership variable (i.e. GD versus healthy control), respectively, using Spearman's rank order correlations. The assumptions for ANOVA were tested prior to the moderation analysis.

3.6 Ethical considerations

The overarching research project has been approved by the Health Research Ethics Committee at Stellenbosch University (HREC reference number: 14/05/053) and the Human Research Ethics Committee at the University of Cape Town (HREC reference number: 770/2014; see *Appendices D and E* for approval letters). It has been and is being conducted according to international and locally accepted ethical guidelines for research, namely the Declaration of Helsinki, and the SA Department of Health's 2004 Guidelines: *Ethics in Health Research: Principles, Structures and Processes*. In addition, this study has been approved by the Human Research Ethics Committee at the University of Witwatersrand (Protocol number: MCLIN/17/004 IH; see *Appendix F*), authorising the researcher to conduct this sub-study at the University of Witwatersrand.

A letter of permission to use this data was provided by the principal investigator of the original study, Professor Christine Lochner (see *Appendix G*). All participants provided written informed consent prior to participation (see *Appendix H*). As stated in the participant information and consent document of the original research project (see *Appendix H*), participants gave consent for the researchers to share their DNA samples and anonymous clinical and imaging information with other research collaborators in the future. The use of the data for this particular study is thus covered by this consent by participants.

With respect to untreated psychological problems being identified during research participation, the following treatment referral systems were put in place for patients with GD: Any persons making calls to the NRGP were/are provided with free telephonic counselling and referred to a treatment network if requested. Therefore, patients recruited via this route may be in treatment for problem gambling or pathological gambling. If one of the researchers identified a serious problem in relation to gambling or other psychiatric conditions in participants during the clinical interview, they were referred to the NRGP or other suitable services for (further) treatment.

Given that a reflection on traumatic childhood experiences can be a distressing experience for some individuals, the study was designed to ensure that research participants completed the CTQ in the presence of a trained researcher who would be able to assist in containing

participants if necessary. In addition, distressed participants received the offer of being referred to a psychologist from the NRGP network in order to process traumatic childhood experiences in therapy.

As described previously (see 3.3 *Sampling*), in order to honour the ethical principle of non-maleficence, the research team also decided to reimburse GD patients for their travel costs, using food vouchers instead of cash since cash might have triggered gambling urges in some GD patients.

Chapter 4: Results

In this chapter, the results of the study are presented. To begin with, data cleaning procedures are described. Thereafter, the results of assumption checks and reliability testing of the utilized scales are illustrated, followed by descriptive statistics pertaining to the study sample and to each of the investigated variables. Following presentation of the descriptive aspects of the data, the results of hypothesis testing are presented for each hypothesis as set out in the original aims of the study (see *1.2 Aims and 3.1 Research Questions*).

4.1 Data Cleaning

Data cleaning was performed in order to identify errors and minimize their impact on study results (Van Den Broeck, Cunningham, Eeckels, & Herbst, 2005). For example, of the total sample of 34 patients with GD from the Western Cape region of South Africa that took part in the overarching study, there were two participants whose **primary** diagnosis was not GD. These participants were consequently excluded from the study. In addition, an analysis of missing data revealed that there were several missing values on the CTQ items for one GD patient, necessitating omission of this patient's entire dataset from the analyses. For eight participants, there was one item missing on the CTQ. These items were replaced with the participant's mean on the subscale of the missing item. For example, if a participant had a missing value for a CTQ item on the subscale 'Emotional Abuse' and the mean of the remaining four items of the 'Emotional Abuse' subscale was 3.25, the missing value was replaced with 3. After cleaning, data obtained from 31 patients with a primary diagnosis of GD and with a full dataset for the variables of interest were processed in the analyses. Data from healthy controls ($n = 31$), matched to the GD patient group according to gender and age, were included.

4.2 Check for assumptions and reliability analysis

4.2.1 Check for assumptions

As described in the *Method* chapter, it was aimed to use a *t*-test to test the hypothesis that self-reported childhood trauma (CTQ Total Score) is higher in the GD group than in the healthy control group (H1). Similarly, it was aimed to test for significant mean differences between the GD and healthy control groups for each of the CTQ subscales using *t*-tests (H4). Since normality of data is one assumption that must be met for the results of parametric tests such as the *t*-test to be valid, it was necessary to check the distribution of data. This was done by

determining the skewness and kurtosis of the continuous variables of interest, presented in *Table 4.1*. Descriptive statistics of the shape of the distribution are reported for each group (i.e. GD vs. healthy controls) separately, because the analysis performed in this study involved the comparison of groups (see Field, 2009).

Table 4.1: Descriptive statistics to check for normality of distribution of data.

Variables	Gambling Disorder (GD)				Healthy Controls			
	Skew- ness	SE	Kurtosis	SE	Skew- ness	SE	Kurtosis	SE
Emotional Abuse	.56	.42	-.60	.82	1.80	.42	2.37	.82
Physical Abuse	1.10	.42	.60	.82	1.21	.42	.35	.82
Sexual Abuse	2.04	.42	3.26	.82	3.21	.42	9.74	.82
Emotional Neglect	.03	.42	-.70	.82	1.39	.42	.33	.82
Physical Neglect	.72	.42	-.76	.82	1.94	.42	3.09	.82
CTQ^a Total Score	.80	.42	-.40	.82	1.46	.42	1.35	.82
PG-YBOCS^b Score	-.29	.42	-.80	.82	-	-	-	-

^aCTQ = Childhood Trauma Questionnaire; ^bPG-YBOCS = Yale-Brown Obsessive Compulsive Scale for Pathological Gambling.

According to Field (2009), if skewness values are greater than 1 or less than -1, it suggests that the distribution is highly skewed. As can be seen in *Table 4.1*, the sampling distribution of a few of the continuous variables in the GD group is significantly positively skewed (e.g. ‘Sexual Abuse’: Skew = 2.04, $z = 4.86$, $p < .001$; see Field, 2009). In the healthy control group, all variables have skewness values which indicate a highly skewed distribution. Therefore, the sampling distribution of the continuous variables of interest cannot be considered to be normal. A further check for normality was conducted by inspecting probability plots, which also suggested that the distributions of these variables were non-normal. Although the assumption of normality is violated, the t -test is relatively robust to departures from normality and therefore the results of t -tests can still be considered valid if the sample size is sufficiently large (Lumley, Diehr, Emerson, & Chen, 2002). Homogeneity of variances is another assumption for t -tests. Results of the Levene Test for homogeneity of variances showed that equal variances could not be assumed. Therefore, Welch’s t -tests were used to test hypotheses H1 and H4.

It was also aimed to test whether self-reported childhood trauma (CTQ Total Score) is a significant predictor of GD severity (PG-YBOCS) in the GD group (H2). Since a linear

relationship between the predictor variable (CTQ Total Score) and the outcome variable (PG-YBOCS) is one assumption that must be met for linear regression analysis, this was first tested using scatterplots. These suggested a non-linear relationship between the predictor variable and the outcome variable. To further test for a linear association between CTQ Total Score and PG-YBOCS score, Spearman's rank order correlations were used. No statistically significant correlation was found between these scores ($\rho(31) = -.009, p = .962$). Similarly, no significant correlations were found between each of the CTQ subscales and the PG-YBOCS (H6). Since the assumption of linearity was violated, linear regression analyses were not conducted to test H2 and H6.

In addition, it was aimed to test the hypothesis that total self-reported childhood trauma (CTQ Total Score) is a significant predictor of a primary diagnosis of GD (H3) using binary logistic regression analysis. Similarly, logistic regression was the planned method to test whether emotional neglect and physical neglect are stronger predictors of a primary diagnosis of GD than other CTQ subscales (H5). The assumptions for a simple logistic regression analysis were all met. For H5, it was checked that there was no perfect linear relationship between two or more of the predictors (i.e. the CTQ subscales) in the model. The correlation matrix between the CTQ subscales demonstrated bivariate correlations below .7. Therefore, the assumption that there is no perfect multicollinearity between the predictors was met.

A further aim was to test the hypothesis that past 12-month stressful life events exposure moderates the relationship between childhood trauma and GD (H7) using a two-way analysis of variance (ANOVA) test. Assumptions were checked before conducting the two-way ANOVA. Firstly, the independent variables should have two or more categorical, independent groups. Since LESS was measured as a continuous variable, it was dichotomized into "LESS low" and "LESS high" using the median for the purpose of this analysis. Secondly, the dependent variable should be approximately normally distributed for each combination of the groups of the two independent variables. Skewness (0.7) and kurtosis (2.09) values for the distribution CTQ Total Score residuals suggest an approximately normal distribution. Further, results of the Shapiro-Wilk Test for normality show that the distribution of the residuals does not differ significantly from a normal distribution. Therefore, the assumption of normality was met. Thirdly, homogeneity of variances was tested using Levene's test. Since the assumption of homogeneity of variances was violated, Welch's *t*-tests were used. All other assumptions were met.

4.2.2 Reliability analysis

Although only well-known and previously validated measures were used in this study, it is recommended to measure the scales' psychometric properties in the specific study sample under investigation (Streiner, 2003). Therefore, the reliability of the CTQ Total Scale, each of the CTQ subscales, as well as the PG-YBOCS, its subscales and the LESS, was tested using Cronbach's alpha (α) as a measure of internal consistency.

Table 4.2 shows the descriptive statistics of the scales for the entire study sample, as well as the results of the reliability analysis. As can be seen in *Table 4.2*, the reliability coefficients for the utilized scales lie between $\alpha = .62$ and $\alpha = .93$. According to Kline (1999), an acceptable cut-off point for Cronbach's α for so-called 'ability tests' is .7. The CTQ subscales 'Physical Abuse' and 'Physical Neglect', as well as the PG-YBOCS subscale for gambling-related behaviours have a Cronbach's α value below .7.

However, it should be noted that the value of α is dependent on the number of items on the scale (Cortina, 1993) – i.e. the lower the number of items, the lower the value of α . Since the affected CTQ and PG-YBOCS subscales only consist of five items each, it is possible that this contributed to a lower Cronbach's α value. The Cronbach's α (0.66) for the LESS was slightly below the acceptable cut-off point of .7 and was perhaps due to the fact that the items of this scale do not form a unidimensional scale. Conceptually, to calculate the total LESS score, one is combining a very heterogeneous array of life events. Furthermore, counting the number of life events endorsed on the LESS (previously named the SRRS) as opposed to calculating differential weights for each life event has been shown to yield a higher internal consistency score (Lei & Skinner, 1980). Therefore, Cronbach's α for the LESS may have been higher had the life event items endorsed been counted instead of weighted individually. Overall, the reliability of these scales ranged from $\alpha = .62$ to $\alpha = .93$ and can be considered to be satisfactory to excellent (Kline, 1999).

Table 4.2: Descriptive statistics and reliability analysis for all scales and subscales.

Scale	Number of items	<i>N</i>	<i>M</i>	<i>SD</i>	α^a
CTQ^b Total Scale	25	62	39.36	14.21	.91
Emotional Abuse	5	62	8.15	3.58	.75
Physical Abuse	5	62	7.23	2.70	.63
Sexual Abuse	5	62	6.73	4.08	.93
Emotional Neglect	5	62	9.89	4.88	.86
Physical Neglect	5	62	7.37	3.14	.62
PG-YBOCS^c Total Scale	10	31	22.52	6.55	.85
Thoughts/Urges	5	31	11.07	3.42	.72
Behaviours	5	31	11.45	3.36	.68
LESS^d	36 ^e	29	166.00	110.32	.66

^a α = Cronbach's α for internal consistency; ^bCTQ = Childhood Trauma Questionnaire; ^cPG-YBOCS = Yale-Brown Obsessive Compulsive Scale for Pathological Gambling; ^dLESS = Life Event Stress Scale; ^e = Original scale consists of 43 items (7 items were not endorsed by any participants).

4.3 Descriptive Statistics

The demographic information of the two study groups (i.e. GD vs. healthy controls) is depicted in *Table 4.3*. The severity of childhood trauma based on pre-defined degree categories is shown in *Table 4.4* for each of the two study groups. This is followed by a comparison of the clinical data across the two groups (see *Table 4.5*). Descriptive statistics for CTQ subscale and total scores and LESS scores are also illustrated with bar charts to provide a visual comparison of the study groups with respect to childhood trauma and past 12-month life stress (see *Figures 4.1, 4.2* and *4.3*). In addition, *Table 4.5* presents descriptive statistics for past 12-month life stress per group, as well as GD severity (PG-YBOCS) in the GD group.

4.3.1 Participant demographics

Approximately 61% of the GD patients were male and 39% were female. GD patients' ages ranged from 22 to 68 ($M = 47.97$, $SD = 11.06$). The majority of the GD group was Coloured (45%) or White (42%). For just over half of the GD sample (52%), the highest level of education was Grade 11-12. More than one third of the GD participants were either pensioners (19%) or unemployed (19%) (see *Table 4.3*).

Because healthy controls were matched to GD patients based on gender and age, these demographic variables are very similar in both groups: Approximately 58% of healthy controls were male and 42% were female. Healthy controls' ages also ranged from 22 to 68 ($M = 47.19$, $SD = 11.25$). However, the two groups differ significantly with regards to some other demographic variables, e.g. population group, level of education and employment status (see Table 4.3). These differences in demographic aspects of the samples were kept in mind in interpreting the results.

Table 4.3: Participant demographics of GD patients and healthy controls.

Variable	Gambling Disorder (GD)		Healthy controls	
	$(n = 31)^a$		$(n = 31)^a$	
	n^a	% ^b	n^a	% ^b
Gender				
Male	19	61.3	18	58.1
Female	12	38.7	13	41.9
Population group				
Coloured	14	45.2	4	12.9
White	13	41.9	23	74.1
Black	2	6.5	2	6.5
Malay	1	3.2	0	0.0
Other	1	3.2	2	6.5
Highest level of education				
Less than Grade 11	6	19.4	0	0.0
Grade 11-12	16	51.6	10	32.2
Tertiary education	9	29.0	21	67.8
Employment status				
Employed	15	48.3	21	67.7
Student	1	3.2	6	19.4
(Disability) Pensioner	6	19.4	0	0.0
Unemployed	6	19.4	0	0.0
Other	3	9.7	4	12.9
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	47.97	11.06	47.19	11.25

^a n = sample size/frequency per group or category; ^b% = percentage of frequency per group

4.3.2 Descriptive statistics by group (GD patients vs. healthy controls)

The severity of childhood trauma reported by GD patients and healthy control participants, i.e. the number and percentage of participants in each degree category of childhood trauma, is depicted in *Table 4.4*. In addition, the number and percentage of participants who reportedly experienced childhood trauma based on pre-defined cut-off scores (Bernstein & Fink, 1998) are shown in the right-hand column of *Table 4.4*. According to cut-off scores for each CTQ subscale, approximately 42% of GD patients reported experiencing emotional abuse (≥ 10 points), 45% physical abuse (≥ 8 points), 26% sexual abuse (≥ 8 points), 42% emotional neglect (≥ 15 points) and 55% physical neglect (≥ 8 points). Comparatively, the rates of childhood trauma subtypes reportedly experienced by healthy control participants are markedly lower, although there was still some indication of exposure to substantive levels of childhood trauma amongst some of the controls (see *Table 4.4*).

Table 4.4: Severity of childhood trauma by group: GD vs. healthy controls.

CTQ ^a subscales	Degree of Childhood Trauma (n(%)) ^b				Cut-off scores ^c (n(%)) ^b
	None or minimal	Low-moderate	Moderate-severe	Severe-Extreme	
Emotional Abuse	[5-8]^d	[9-12]	[13-15]	[16-25]	[≥10]
GD ^e	14(45.2)	10(32.3)	5(16.1)	2(6.5)	13(41.9)
Healthy controls	25(80.6)	3(9.7)	3(9.7)	0(0.0)	5(16.1)
Physical Abuse	[5-7]	[8-9]	[10-12]	[13-25]	[≥8]
GD	17(54.8)	4(12.9)	7(22.6)	3(9.7)	14(45.2)
Healthy controls	24(77.4)	4(12.9)	3(9.7)	0(0.0)	7(22.6)
Sexual Abuse	[5]	[6-7]	[8-12]	[13-25]	[≥8]
GD	19(16.3)	4(12.9)	4(12.9)	4(12.9)	8(25.8)
Healthy controls	27(87.1)	1(3.2)	2(6.5)	1(3.2)	3(9.7)
Emotional Neglect	[5-9]	[10-14]	[15-17]	[18-25]	[≥15]
GD	10(32.3)	8(25.8)	10(32.3)	3(9.7)	13(41.9)
Healthy controls	25(80.6)	6(19.4)	0(0.0)	0(0.0)	0(0.0)
Physical Neglect	[5-7]	[8-9]	[10-12]	[13-25]	[≥8]
GD	14(45.2)	8(25.8)	2(6.5)	7(22.6)	17(54.8)
Healthy controls	27(87.1)	3(9.7)	1(3.2)	0(0.0)	4(12.9)

^aCTQ= Childhood Trauma Questionnaire; ^bn(%) = frequency (percentage of frequency) per group and category;

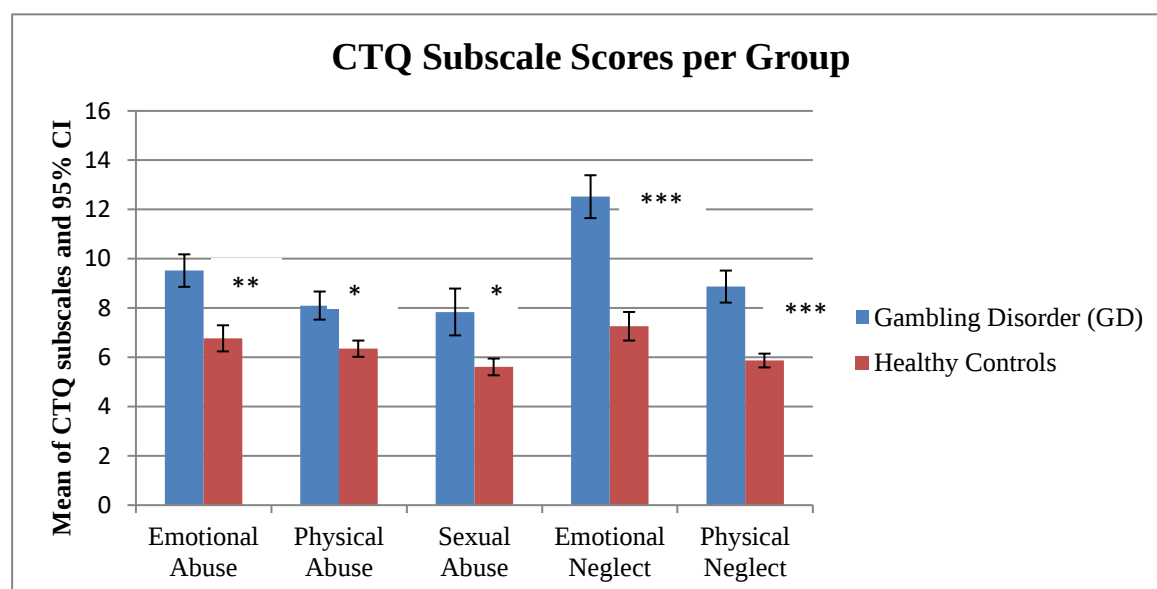
^cCut-off scores for each subtype of childhood trauma (Bernstein & Fink, 1998); ^d[] = range of scores for each degree category of childhood trauma; ^eGD = Gambling Disorder.

As shown in *Table 4.5* and *Figure 4.1*, the mean values of self-reported subtypes of childhood trauma are significantly higher in the GD patient group for all CTQ subscales compared with the healthy control group.

Table 4.5: Comparison of clinical data across groups: GD vs. healthy controls.

Variable	Gambling Disorder (GD)			Healthy controls			
CTQ ^a subscales	<i>n</i>	<i>M (SD)</i>	Range	<i>n</i>	<i>M (SD)</i>	Range	<i>p</i>
Emotional Abuse	31	9.52(3.68)	5-18	31	6.77(2.94)	5-15	.002
Physical Abuse	31	8.10(3.16)	5-16	31	6.35(1.82)	5-11	.011
Sexual Abuse	31	7.84(5.27)	5-24	31	5.61(1.87)	5-13	.033
Emotional Neglect	31	12.52(4.86)	5-23	31	7.26(3.23)	5-14	<.001
Physical Neglect	31	8.87(3.59)	5-16	31	5.87(1.59)	5-11	<.001
CTQ Total Score	31	46.84(15.18)	27-77	31	31.87(8.00)	25-53	<.001
LESS ^b	16	224.06(100.02)	58-393	13	94.54(76.57)	0-248	.001
PG-YBOCS ^c	31	22.52(6.55)	10-33	-	-	-	—

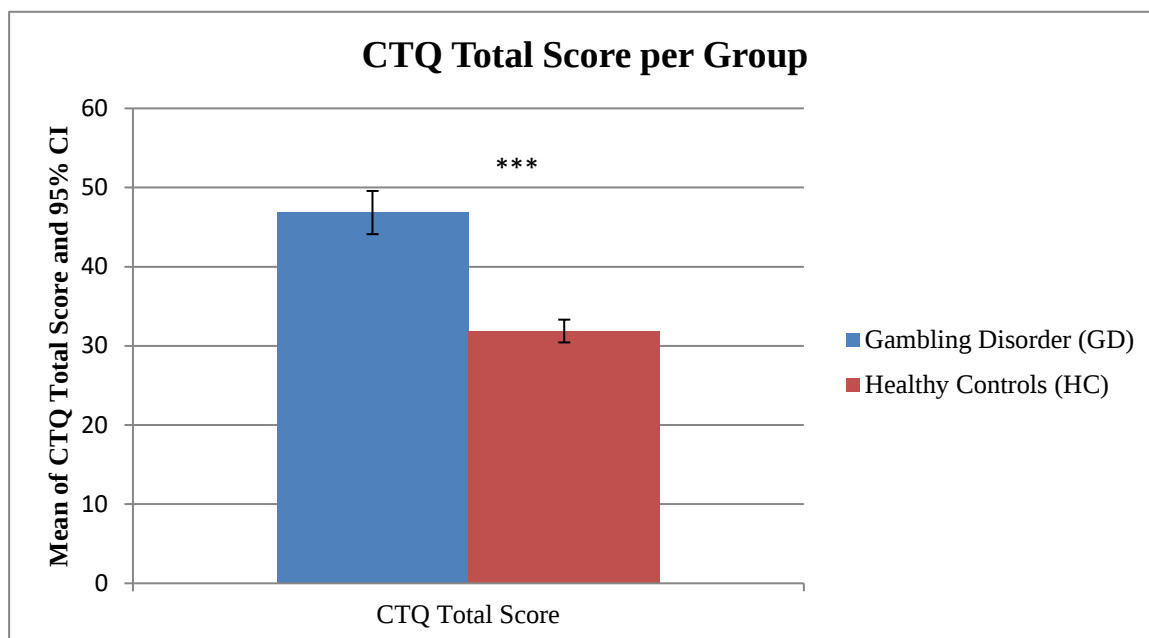
^aCTQ = Childhood Trauma Questionnaire; ^bLESS = Life Event Stress Scale; ^cPG-YBOCS = Yale-Brown Obsessive Compulsive Scale adapted for Pathological Gambling; all *p*-values are two-tailed.



CTQ = Childhood Trauma Questionnaire; 95% CI = 95% confidence interval each of the CTQ subscale means per group; * = $p < .05$; ** = $p < .01$; *** = $p < .001$; all *p*-values are two-tailed.

Figure 4.1: Mean and 95% confidence interval of CTQ subscales for GD vs. healthy controls.

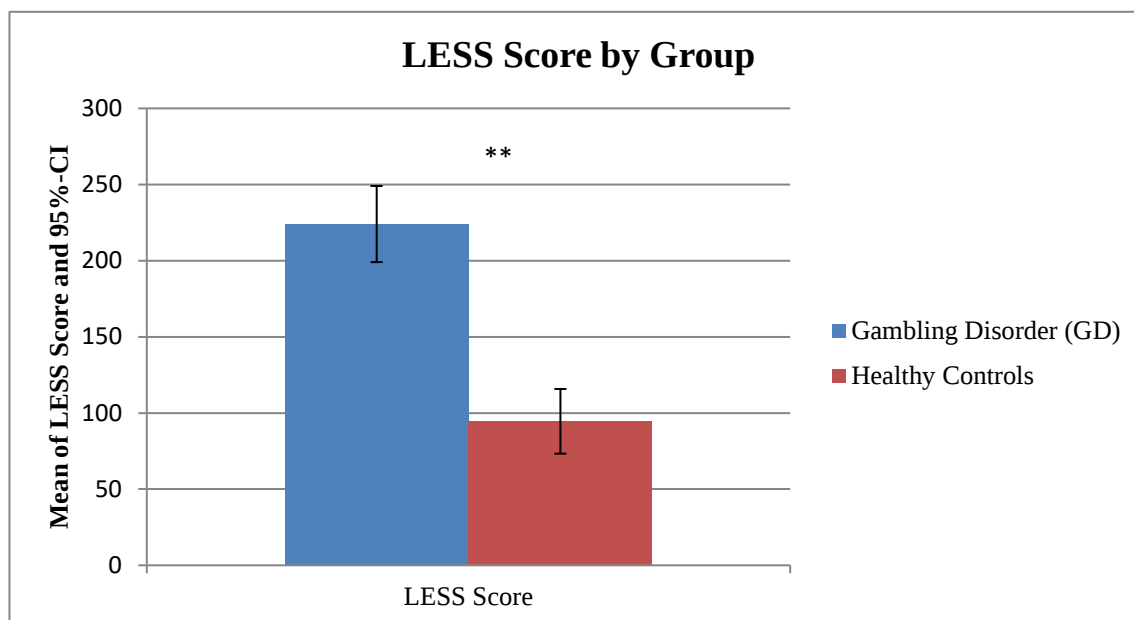
Similarly, *Figure 4.2* demonstrates that the mean CTQ Total Score of self-reported childhood trauma is significantly higher in the GD group ($M = 46.84$, $SD = 15.18$) than in the healthy control group ($M = 31.87$, $SD = 8.00$) (see *Figure 4.2*).



CTQ = Childhood Trauma Questionnaire; 95% CI = 95% confidence interval for CTQ Total Score mean per group; ***= $p < .001$; all p -values are two-tailed.

Figure 4.2: Mean and 95% confidence interval of CTQ Total Score for GD vs. healthy controls.

The mean LESS value in the GD group ($M = 224.06$, $SD = 100.02$) is more than twice the mean value in the healthy control group ($M = 94.54$, $SD = 76.57$) (see Figure 4.3). The mean PG-YBOCS score in this GD group is $M = 22.52$ ($SD = 6.55$).



LESS = Life Event Stress Scale; 95% CI = 95% confidence interval for the mean LESS score per group; ** = $p < .01$; all p -values are two-tailed.

Figure 4.3: Mean and 95% confidence interval of LESS Score for GD vs. healthy controls.

4.4 Results of Hypothesis Testing

4.4.1 (RQ1): Do levels of childhood trauma differ between the GD and healthy control groups?

To test the hypothesis (H1) that total self-reported childhood trauma (CTQ Total Score) would be higher in the GD group compared to healthy controls, a Welch's t -test was used. An alpha level of .05 was used for all statistical tests, unless otherwise specified. The CTQ Total Score was significantly greater in the GD group ($M = 46.84$, $SD = 15.18$) than in the healthy control group ($M = 31.87$, $SD = 8.00$), $t(46) = 4.86$, $p < .001$, $d = 1.23$). Thus, hypothesis H1 was supported by the results.

As described in the section on assumption checks (see 4.2.1 *Check for assumptions*), the hypothesis that self-reported childhood trauma (CTQ Total Score) is a significant predictor of GD severity (PG-YBOCS) in the GD group (H2) could not be tested using linear regression

due to a violation of the assumption of linearity. It was shown that no statistically significant correlation was found between CTQ Total Score and PG-YBOCS scores ($\rho(31) = -.009, p = .962$).

In order to test the hypothesis that total self-reported childhood trauma (CTQ Total Score) is a significant predictor of the presence of a primary diagnosis of GD (H3), a logistic regression analysis was conducted. CTQ Total Score was entered into the model as a predictor, group membership (i.e. GD vs. healthy controls) as the dependent variable, and age, gender, level of education and population group were entered as possible confounding variables. Due to very small numbers in some of the categories of level of education and population group (e.g. $n = 1$ for the category “no school”), some categories were grouped together before the variables were entered into the regression model. Level of education was recoded into a dichotomous variable with the categories “school education” and “tertiary education”. Population group was recoded into a dichotomous variable with the categories “Non-Caucasian” and “Caucasian”. Results are presented in *Table 4.6*.

Table 4.6: Logistic regression with CTQ Total Score as the predictor and group membership (GD vs. healthy controls) as the outcome variable.

	Coefficients					95% CI for OR ^a		
Full model	b_j^b	SE^c	$Wald^d$	df	p	OR ^e	Lower ^f	Upper ^g
Age	-.03	.04	.60	1	.438	.97	.91	1.04
Gender (male)	.20	.88	.05	1	.82	1.22	.22	6.84
Population (Caucasian)	-.10	.82	1.47	1	.23	.37	.07	1.84
Education level (school)	3.63	1.16	9.80	1	.002	37.54	3.88	363.47
CTQ ^h Total Score	.20	.06	11.14	1	.001	1.22	1.09	1.37
Constant	-7.59	2.74	7.67	1	.006	.001	-	-

^a95% CI for OR = 95% confidence interval for the odds ratios (i.e. exponentiation of the beta coefficients), ^b b_j = beta coefficients, ^cSE = standard error of beta coefficients, ^dWald = Wald statistic, ^eOR = odds ratios, ^fLower = Lower bound of 95% confidence interval, ^gUpper = Upper bound of 95% confidence interval, ^hCTQ = Childhood Trauma Questionnaire; all p -values are two-tailed.

A test of the full model against a constant only model was statistically significant ($\chi^2(0.5; 5, N = 62) = 43.10, p < .001$). Nagelkerke’s R^2 of .67 indicated a strong relationship between prediction and group membership. Prediction success overall was 86%, i.e. 87% for the GD group and 84% for the healthy control group. The Wald criterion demonstrated that the CTQ Total Score made a significant contribution to prediction ($p = .001$). Specifically, a 1 unit

increase in the CTQ Total Score increased the odds of being part of the GD group approximately 1.2 times. Age, gender and population group were not significant predictors of group membership, but level of education made a significant contribution to prediction ($p = .002$). Specifically, a participant with only a school education was approximately 38 times more likely to be part of the GD group than a participant with tertiary education. Thus, hypothesis H3 was supported by the results. In addition, it was evident that education level and likelihood of being part of the GD group were related and that it was therefore important to consider education level as a possible confounding variable in relation to prediction.

4.4.2 (RQ2): Do specific types of trauma (emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect) have a stronger association with GD than others?

Welch's t -tests were used to test for any significant differences in mean values of the CTQ subscales between the two groups (H4). Results are presented in *Table 4.7*.

Table 4.7: Welch's t -tests for each of the CTQ subscales.

CTQ ^a subscales	GD ^b ($n=31$)		Healthy controls ($n=31$)		Hypothesis Testing			Effect size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>T</i>	<i>df</i>	<i>p</i>	<i>d</i> ^c
Emotional Abuse	9.52	3.68	6.77	2.94	3.24	60	.002	0.82
Physical Abuse	8.10	3.16	6.36	1.82	2.66	48	.011	0.68
Sexual Abuse	7.84	5.27	5.61	1.87	2.22	37	.033	.056
Emotional Neglect	12.52	4.86	7.26	3.23	5.02	52	<.001	1.27
Physical Neglect	8.87	3.59	5.87	1.59	4.25	41	<.001	1.08

^aCTQ = Childhood Trauma Questionnaire; ^bGD = Gambling Disorder; ^c d = effect size; all p -values are two-tailed.

Table 4.7 demonstrates that the degree of each type of self-reported childhood trauma (emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect) is significantly higher in the GD group compared to the healthy control group. Thus, hypothesis H4 was supported by the results.

To test whether emotional neglect and physical neglect are stronger predictors of the presence of GD than physical abuse, sexual abuse and emotional abuse (H5), a multiple logistic regression analysis was conducted with group membership (GD vs. healthy controls) as the dependent variable and the five subtypes of childhood trauma (CTQ subscales) as predictors. Since level of education was the only demographic variable shown to be a significant predictor of group membership (GD vs. healthy controls) (see 4.4.1), it was entered into this model as well. Gender, age and population group were not significant predictors and were therefore excluded. Results are presented in *Table 4.8*.

Table 4.8: Multiple logistic regression with CTQ subscales as the predictors and group membership (GD vs. healthy controls) as the outcome variable.

Full model	Coefficients					95% CI for OR^a		
	<i>b_j^b</i>	<i>SE^c</i>	<i>Wald^d</i>	<i>df</i>	<i>p</i>	<i>OR^e</i>	<i>Lower^f</i>	<i>Upper^g</i>
Education level (school)	4.02	1.26	10.16	1	.001	55.76	4.71	660.77
Emotional Abuse	.26	.18	1.99	1	.158	1.29	.91	1.84
Physical Abuse	.27	.26	1.10	1	.295	1.31	.79	2.18
Sexual Abuse	-.15	.20	.56	1	.453	.86	.58	1.27
Emotional Neglect	.22	.13	2.76	1	.097	1.25	.96	1.62
Physical Neglect	.63	.28	5.00	1	.025	1.88	1.08	3.27
Constant	-11.49	3.31	12.06	1	.001	.000	-	-

^a95% CI for OR = 95% confidence interval for the odds ratios (i.e. exponentiation of the beta coefficients), ^b*b_j* = beta coefficients, ^c*SE* = standard error of beta coefficients, ^d*Wald* = Wald statistic, ^eOR = odds ratios, ^fLower = Lower bound of 95% confidence interval, ^gUpper = Upper bound of 95% confidence interval; all *p*-values are two-tailed.

A test of the full model against a constant only model was statistically significant ($\chi^2(0.5; 6, N = 62) = 46.36, p < .001$). Nagelkerke's R^2 of .70 indicated a strong relationship between prediction and group membership. Prediction success overall was 89%, i.e. 84% for the GD group and 94% for the healthy control group. The Wald criterion demonstrated that physical neglect made a significant contribution to prediction ($p = .025$). Specifically, a 1 unit increase of the physical neglect score increased the odds of being part of the GD group approximately 1.9 times. Emotional neglect did not reach significance at the alpha level of .05, but it was shown to be a significant predictor at the alpha level of .10 ($p = .097$). In other words, there was a trend towards significance. Level of education also made a significant contribution to prediction ($p = .001$). Specifically, a participant with a school education only was

approximately 56 times more likely to be part of the GD group than a participant with tertiary education.

In summary, physical neglect was a significant predictor of group membership, i.e. the presence of GD, and emotional neglect showed a trend towards significance, whereas emotional abuse, physical abuse and sexual abuse did not significantly predict the presence of GD. Furthermore, level of education significantly predicted group membership, i.e. lower level of education increased the likelihood of the presence of GD. Thus, hypothesis H5 was partially supported by the results.

Spearman's rank-order correlations were used to test for positive associations between each of the CTQ subscales and GD severity (PG-YBOCS total score). As can be seen in *Table 4.9* below, none of the subtypes of childhood trauma were significantly correlated with GD severity.

Table 4.9: Spearman's correlations between each of the CTQ subscales and PG-YBOCS.

	Spearman's correlation with PG-YBOCS ^a total score		
CTQ ^b subscales	<i>n</i>	<i>ρ</i>	<i>p</i>
Emotional Abuse	31	.21	.256
Physical Abuse	31	-.12	.532
Sexual Abuse	31	-.09	.639
Emotional Neglect	31	.08	.679
Physical Neglect	31	-.24	.196

^aPG-YBOCS = Yale-Brown Obsessive Compulsive Scale for Pathological Gambling; ^bCTQ = Childhood Trauma Questionnaire; all *p*-values are two-tailed.

Therefore, the hypothesis that emotional neglect and physical neglect are stronger predictors of GD severity (PG-YBOCS total score) than emotional abuse, physical abuse and sexual abuse in the GD group (H6) could not be tested using linear regression due to a violation of the assumption of linearity.

4.4.3 (RQ3): How does past 12-month stressful life events exposure influence the relationship between childhood trauma and GD?

To test the hypothesis that past 12-month stressful life events exposure (as measured using the LESS) moderates the relationship between childhood trauma and presence of GD (H7), Spearman's rank-order correlations were first used to check for a significant association

between the independent variable (group membership, i.e. GD vs. healthy controls), the dependent variable (CTQ Total Score) and the potential moderator (LESS total score). All bivariate correlations were significant: Group membership and CTQ Total Score ($\rho = .60, p < .001$), group membership and LESS ($\rho = .61, p = .001$), and CTQ Total Score and LESS ($\rho = .579, p = .001$).

A moderation effect can be tested using a two-way analysis of variance (ANOVA). Because ANOVA requires categorical independent variables, LESS scores were dichotomized into “LESS low” and “LESS high” using the median split method. It was tested whether there is an interaction between group membership and past 12-month stressful life events exposure on total childhood trauma, where group membership (GD vs. healthy controls) and LESS (low vs. high) are the independent variables and CTQ Total Score is the dependent variable. Descriptive statistics for the ANOVA are reported in *Table 4.10* below.

Table 4.10: Descriptive statistics for the two-way ANOVA with CTQ Total Score as the dependent variable.

Dependent variable: CTQ ^a Total Score		<i>M</i>	<i>SD</i>	<i>n</i> (%) ^b
Level of group membership	Level of LESS ^c			
Gambling Disorder (GD)	Low	51.80	13.88	5 (17.3)
	High	44.82	12.56	11 (37.9)
	Total ^d	47.00	12.95	16 (55.2)
Healthy Controls	Low	27.22	2.54	9 (31.0)
	High	42.25	8.62	4 (13.8)
	Total ^e	31.85	8.66	13 (44.8)
Total	Low	36.00	14.58	14 (48.3)
	High	44.13	11.40	15 (51.7)
	Total ^f	40.21	13.45	29 (100.0)

^aCTQ = Childhood Trauma Questionnaire; ^b*n*(%) = frequency (percentage) of sample size per group and level of LESS; ^cLESS = Life Event Stress Scale; ^dTotal = Total of GD participants who completed LESS; ^eTotal = Total of healthy controls who completed LESS; ^fTotal = Total of sample that completed LESS.

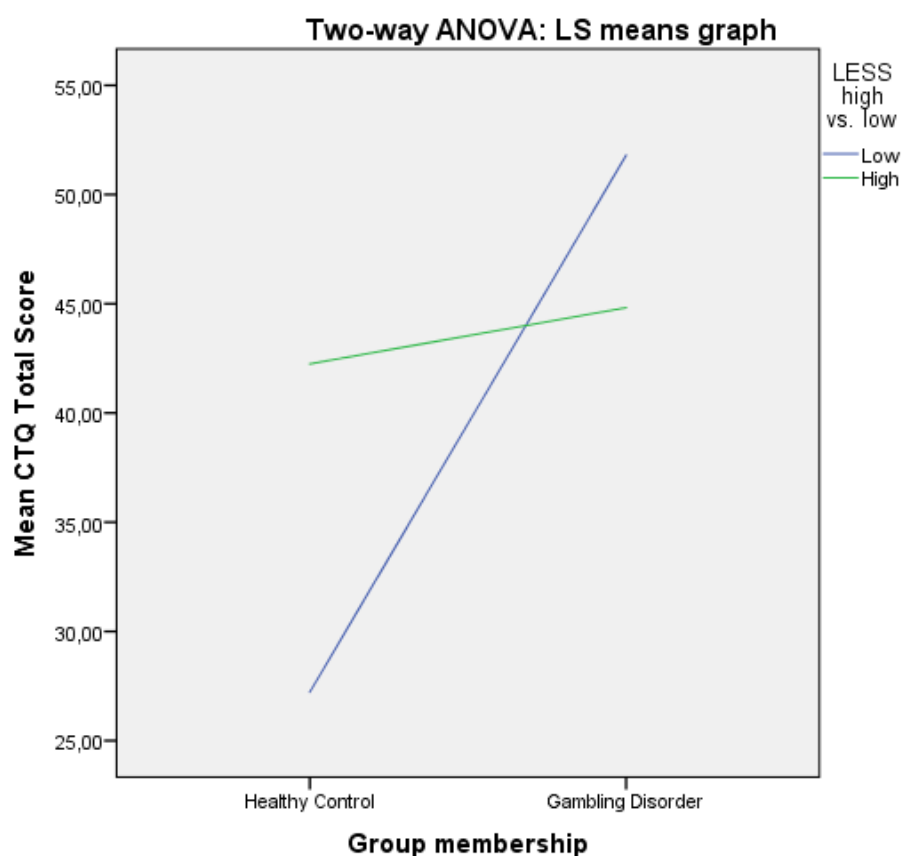
Results of the main effects and interaction effects of the ANOVA are depicted in *Table 4.11* and *Figure 4.4*. It can be seen that the interaction term (i.e. group membership*LESS) is significant ($F(1,25) = 7.082, p = .01$), indicating that group membership and past 12-month stressful life events exposure are significantly associated with reporting of exposure to

childhood trauma. This appears to suggest that both childhood trauma exposure and past 12-month stressful life events exposure are associated with group membership, i.e. the likelihood of having GD.

Table 4.11: Two-way ANOVA with CTQ Total Score as dependent variable.

Dependent variable: CTQ ^a Total Score	Sum of Squares	<i>df</i>	<i>F</i>	<i>p</i>
Group membership (GD vs. healthy controls)	1130.18	1	10.77	.000
LESS ^b (low vs. high)	99.29	1	0.95	.34
Group membership*LESS ^a	742.96	1	7.08	.01
Residuals	2622.74	25		

^aCTQ = Childhood Trauma Questionnaire; ^bLESS = Life Event Stress Scale



LS means = Least Squares means; CTQ = Childhood Trauma Questionnaire; LESS = Life Event Stress Scale

Figure 4.4: Mean CTQ Total Score by group membership (GD vs. healthy controls) by LESS score (low vs. high).

Results of the post hoc tests are depicted in *Table 4.12*.

Table 4.12: Post hoc table of contrasts for two-way ANOVA.

Cell no.	Level of group membership	Level of LESS ^a	{1} ^b <i>M</i> = 27.22	{2} ^c <i>M</i> = 42.25	{3} ^d <i>M</i> = 51.80	{4} ^e <i>M</i> = 44.82
			<i>p</i>	<i>p</i>	<i>p</i>	<i>p</i>
1 ^b	Healthy Control	Low		.02	.00	.00
2 ^c	Healthy Control	High	.02		.18	.67
3 ^d	Gambling Disorder (GD)	Low	.00	.18		.22
4 ^e	Gambling Disorder (GD)	High	.00	.67	.22	

^aLESS = Life Event Stress Scale; ^b1= Group 1: Healthy controls with a low level of stressful life events; ^c2 = Group 2: Healthy controls with a high level of stressful life events; ^d3 = Group 3: Gambling disorder patients with a low level of stressful life events; ^e4 = Group 4: Gambling disorder patients with a high level of stressful life events; all *p*-values are two-tailed.

Simple main effects analysis showed that GD patients reported a significantly higher degree of childhood trauma (CTQ Total Score) than healthy controls when exposure to past 12-month stressful life events (LESS) was low ($p < .001$). However, there were no differences between the GD and healthy control groups in the degree of childhood trauma (CTQ Total Score) when exposure to current stressful life events (LESS) was high ($p = .67$). In other words, the higher the LESS score, the more it diminished the predictive effect of childhood trauma on group membership (i.e. the presence of GD). This suggests a trend towards past 12-month stressful life events exposure (LESS) acting as a moderator of the relationship between childhood trauma and GD. Thus, hypothesis H7 was supported by the results.

Chapter 5: Discussion

The aim of this study was to investigate the association between childhood trauma and gambling disorder (GD). The main research question (RQ1) involved the examination of the associations between childhood trauma in general and GD, while the second research question (RQ2) focussed on identifying specific subtypes of childhood trauma that may have a stronger association with GD than others. It was also investigated whether past 12-month stressful life events exposure might act as a possible moderator of the relationship between childhood trauma and the presence of GD (RQ3).

In this chapter, the results relating to these research questions are interpreted and discussed in the context of relevant existing literature. Study strengths and limitations are addressed towards the end. Consideration is given to translating findings from bench to bedside, i.e. for implementation in clinical settings, and to the ways in which the study results can inform future avenues of research in the field of childhood trauma, stress and addiction.

5.1 Interpretation of results of hypothesis testing

5.1.1 Increased rates of reported childhood trauma in GD

Results relating to hypothesis H1 showed that self-reported childhood trauma was significantly higher in the GD patient group compared to the healthy control group, suggesting that patients with GD are more likely to have been exposed to abuse and neglect in their childhood than healthy controls. The mean CTQ scores found in the healthy control group are comparable to the mean CTQ scores reported for a normative sample from the U.S. within the same age range (Scher, Stein, Asmundson, McCreary, & Forde, 2001), whereas the mean CTQ scores in the GD group are considerably higher. These findings are consistent with previous research that found that childhood trauma is highly prevalent in GD, with adult individuals with gambling problems consistently reporting greater trauma history than those without problem or pathological gambling (Black et al., 2012; Hodgins et al., 2010, 2012; Kausch et al., 2006; McCormick et al., 2012; Petry & Steinberg, 2005; Scherrer et al., 2007).

The finding concerning hypothesis H1 contributes to the growing evidence suggesting that there may be similarities in the aetiology of behavioural addictions such as GD and substance use disorders. Since increased rates of childhood trauma have also been reported by patients with behavioural addictions other than GD, such as eating disorders (Alvarez, Pavao, Baumrind, & Kimerling, 2007; Wonderlich et al., 2001), internet addiction (Dalbudak et al.,

2014) and sexual compulsivity (McPherson et al., 2013), as well as in substance use disorders (Cuomo et al., 2008; Duncan, 2005; Hawkins et al., 1992; Kendler et al., 2000; Lopez-Patton et al., 2015), this suggests that childhood trauma could be a common underlying factor in both behavioural addictions and substance use disorders.

Considering that increased rates of childhood trauma have been found in patients with various mental disorders (Barrett et al., 2015; Bryer, Nelson, Miller, & Kroll, 1987; Heim & Nemeroff, 2001; Kessler, Davis, & Kendler, 1997; Lochner et al., 2002; Walker et al., 1992), it could also be argued that the group differences in childhood trauma rates are due to psychopathology in general rather than GD specifically. However, studies investigating GD have shown that the association between childhood trauma and GD remains even after controlling for symptoms of typically comorbid mental disorders, such as substance use disorders, major depression, and antisocial personality disorder (Hodgins et al., 2010; Petry & Steinberg, 2005), possibly suggesting a distinct link between childhood trauma and GD in particular.

5.1.2 Childhood trauma as a predictor of GD

It was hypothesized that childhood trauma would be a significant predictor of the presence of GD in the study sample (H3). In accordance with expectations, results showed that self-reported childhood trauma reliably distinguished between the GD patient group and the healthy control group, with childhood trauma appearing to be a significant predictor of GD. In other words, childhood trauma can be considered a risk factor for the development of problem or pathological gambling. These results support previous findings of childhood trauma as a risk factor for addictive disorders in general (Brydges, Holmes, Harris, Cardinal, & Hall, 2015), and problem or pathological gambling specifically (Felsher et al., 2010; Hodgins et al., 2012).

In addition to childhood trauma, our findings also suggested that educational level was a significant predictor of the presence of GD. Study participants with a lower education level (i.e. Grade 12 or less) were significantly more likely to be part of the GD patient group than participants who had completed tertiary education. Arguably, it is possible that individuals with lower education levels may have a stronger tendency to seek alternative ways of increasing their income (i.e. by gambling) than college/university graduates who may find employment opportunities more easily. It is also conceivable that people with higher education levels are better able to appreciate that the odds in gambling are in favour of

gambling institutions and are therefore better able to temper hopefulness about positive outcomes. However, this finding warrants further study in research specifically designed to assess links between education level and GD propensity. It should further be noted that the majority of GD patients in this study sample were Coloured, whereas most of the healthy controls were White. Given South Africa's socio-political history of disadvantaging non-Caucasian population groups which resulted in unequal access to education, it is possible that the composition of the two study groups reflects some conflation between race group and education level. However, since population group was not found to be a confounding variable in the regression models, the influence of population group on study results can be considered minimal. What was evident was that both presence of childhood trauma and education level were predictive of GD within this study.

5.1.3 Types of childhood trauma exposure and GD

Certain types of childhood trauma may have stronger associations with behavioural addictions in later life than others. Therefore, it was examined whether certain types of childhood trauma had varying degrees of association with GD. Results showed that all of the subtypes of childhood trauma measured here (i.e. emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect) were found to be significantly higher in the GD group compared to the healthy control group (H4). The rates of subtypes of childhood trauma (CTQ subscales) in the current study are strikingly similar to those reported by Felsher, Derevensky and Gupta (2010) in their study of the impact of childhood maltreatment on young adults with gambling problems in Canada. Previous studies also indicate that GD patients are more likely to report multiple forms of childhood abuse than healthy control participants (e.g. Black et al., 2012). Moreover, there are more pronounced differences between the GD and healthy control groups with respect to some subtypes of childhood trauma that are reported; specifically, *emotional neglect* appears to be reported with much greater frequency in GD patients compared to controls in our study sample.

Previous findings on the subtypes of trauma that have the strongest associations with behavioural addictions have been inconsistent. It seems that emotional abuse and emotional neglect are frequently reported to have the strongest associations with GD (Black et al., 2012; Felsher et al., 2010; Kausch et al., 2006) and other behavioural addictions (Dalbudak et al., 2014; McPherson et al., 2013). There is also some evidence for strong associations between physical neglect and GD (Felsher et al., 2010; Nixon et al., 2012). Findings of significant relationships between physical abuse and GD (Nixon et al., 2012) and sexual abuse and GD

(Larsen et al., 2013) are somewhat less compelling. One explanation for such inconsistencies regarding links between GD and subtypes of childhood trauma within behavioural addictions research may be that these trauma subtypes are defined and measured differently across studies. For example, McPherson and colleagues (2013) used a subscale of emotional abuse which included item content such as “being ignored” or “being treated in a cold, or uncaring way or made to feel like they were not loved” (McPherson, Clayton, Wood, Hiskey, & Andrews, 2013, p.266). These types of items are more consistent with the CTQ subscale of emotional neglect than the subscale of emotional abuse (Bernstein et al., 2003). Therefore, it appears that some studies do not clearly distinguish between emotional abuse and emotional neglect.

5.1.4 Types of childhood trauma as predictors of GD

To better understand the complex association of childhood trauma and GD, different subtypes of childhood trauma were investigated as possible predictors of GD. Based on previous research findings concerning the prevalence of the different types of childhood trauma in GD (e.g. Felsher et al., 2010), it was hypothesized that emotional neglect and physical neglect would be stronger predictors of GD than other types of trauma (H5). Results demonstrated that *physical neglect* was the only predictor that reliably distinguished between our GD patient group and the healthy control group. One explanation for this finding may be that individuals who have been exposed to physical neglect in childhood subconsciously seek material gain or a more glamorous lifestyle in adulthood. Another study (Nixon et al., 2012) offers support for this argument: some female pathological gamblers who had experiences of physical neglect in childhood described being drawn in by the glitz and glamour of gambling and being admired for winning and consequently having money (Nixon et al., 2012). This view is compatible with the evidence from neurobiological studies that dopamine is released in a brain region called the nucleus accumbens during gambling activities, which reinforces the attractiveness of the rewards (money, in this case) (Berridge, 2007). Money is a strong reward, associated with abundance and power in all human civilizations (Anselme & Robinson, 2013). As with other sources of reward, money has been shown to enhance mesolimbic dopamine levels in the human striatum during gambling episodes, suggesting that the accumulation of money is what motivates many gamblers (e.g. Pessiglione et al., 2007). Perhaps this is even more so the case with those gamblers with a history of being physically (or emotionally) neglected. Our findings also suggested a trend towards significance for

emotional neglect. Emotional abuse, physical abuse and sexual abuse were not significant predictors of GD in our study.

The findings of this study suggest that the two types of neglect are stronger predictors of the development of GD than the three types of abuse. In other words, the experience of neglect, particularly physical neglect, in childhood could be a significant risk factor for the development of problem or pathological gambling in adulthood. As discussed in the review of the literature, somewhat similar to these findings, Felsher and colleagues (2010) identified physical neglect and emotional neglect as the most commonly experienced forms of childhood adversity amongst pathological gamblers. Similarly, Scherrer and colleagues (2007) also found child neglect to be significantly associated with GD (Scherrer et al., 2007). It could be argued that neglect could be more harmful to specific aspects of emotional development than physical abuse, because neglect implies fewer experiences of bonding between child and caregiver (Felsher et al., 2010). This suggests that neglect could have a closer association with GD than other subtypes of childhood trauma, as will be discussed further in the section on future avenues of research.

Notably, there is evidence to suggest that substance use disorders have stronger associations with child abuse than with child neglect. Physical and sexual abuse appear to be the most common subtypes of childhood trauma that have been associated with substance (including alcohol) addictions in previous research (e.g. Duncan, 2005; Duncan et al., 1996; Farrugia et al., 2011; Fetzner et al., 2011; Fullilove et al., 1993; Meade et al., 2012). It should be taken into account that some of these studies, particularly the older ones, only investigated physical and/or sexual abuse in substance users without considering emotional abuse or child neglect. When emotional abuse was investigated as a possible subtype of childhood trauma, some studies found high prevalence rates of emotional abuse in substance-abusing populations (Brockie et al., 2015; Cuomo et al., 2008; Fetzner et al., 2011).

It therefore seems plausible that there is a difference in vulnerability regarding the development of substance addictions as opposed to behavioural addictions: while child abuse seems to predispose individuals to alcohol and/or substance use, child neglect appears to increase the risk of the development of the behavioural addiction of GD. In other words, while childhood trauma in a more general sense appears to be a shared vulnerability factor for both substance and behavioural addictions, the underlying specific aetiological pathways may differ with respect to the type of childhood trauma experienced. Further research is needed to

elucidate these aetiological mechanisms for substance use disorders as well as behavioural addictions such as GD.

5.1.5 Childhood trauma and gambling severity

As noted above, the results demonstrate a significant association between childhood trauma and GD. Investigating the nature of this association more carefully, it was aimed to determine whether childhood trauma was positively associated with gambling severity in the GD group. Results demonstrated that there was no significant correlation between childhood trauma in general and gambling severity in the GD group (H2). The investigation of possible links between gambling severity and specific subtypes of childhood trauma also produced non-significant results (H6). It appears that childhood trauma may be significantly associated with the presence of problem or pathological gambling, but not with gambling severity.

Previous research on the relationship between childhood trauma and gambling severity has produced mixed results. For example, Leppink and Grant (2015) could not find any significant differences in gambling severity between problem gamblers who had experienced trauma as opposed to problem gamblers without a history of trauma, whereas Hodgins and colleagues (2010) found that childhood trauma predicted gambling severity and frequency. Similarly, Felsher and colleagues (2010) reported significant associations between childhood trauma and gambling severity. However, their study sample was categorized into four groups based on the number of DSM criteria met for GD. In other words, ‘gambling severity’ referred to categories such as ‘social gambler’ (72% of their sample) and ‘pathological gambler’ (2%) (Felsher et al., 2010) rather than referring to a linear measure of symptom severity in their analyses. In our study, the GD patient group consisted only of ‘pathological gamblers’ and the severity of gambling-related symptoms was reflected by the PG-YBOCS total score. Different measures or classifications of GD severity limit the comparability of these studies.

5.1.6 Stressful life events as a moderator of the relationship between childhood trauma and GD

In line with the idea of a complex association between childhood trauma and GD, one of the factors potentially influencing this relationship was explored. It was hypothesized that past 12-month stressful life events exposure may act as a moderator of the relationship between childhood trauma and GD (H7). Results demonstrated that the predictive effect of childhood trauma on group membership (i.e. the presence or absence of GD) significantly diminished

when exposure to past 12-month stressful life events was reported to be high, suggesting a trend towards past 12-month stressful life events exposure acting as a moderator of the relationship between childhood trauma and GD. More specifically, it was found that in study participants with high levels of recent stressful life events, the degree of self-reported childhood trauma was also high, regardless of whether the participants belonged to the GD patient or healthy control group. In other words, childhood trauma was no longer the differentiating factor between the two groups. When levels of recent stressful life events were low, there was a significant difference in the degree of childhood trauma between GD patients and healthy controls. These findings suggest that if individuals experience either a high degree of childhood trauma or a high level of stressful life events, they may be more likely to have GD. These two features in combination are also likely to create a context in which risk of developing GD is particularly high, even if they each independently contribute to the picture. In conclusion, these study results suggest that both childhood trauma and current stressful life events are factors that potentially influence the development of GD.

Notably, although a strong positive association was found between childhood trauma and recent life stress, a causal relationship cannot be inferred. It appears that childhood trauma and recent life stress may have a bidirectional influence on each other in the sense that exposure to childhood trauma may be associated with greater risk of exposure to stressful life events and recent exposure may compound the impact of prior exposure in specific ways, but further research is needed to investigate this association – particularly in GD. It seems plausible that high levels of recent life stress may predispose an individual to develop GD, but GD may also increase the likelihood of being exposed to stressful life events (e.g. experiencing severe financial strain, relational difficulties etc.). As is evident from these findings, the association between childhood trauma and GD is highly complex and likely to be influenced by a range of factors, including exposure to recent stressful life events.

5.2 Strengths and limitations of the study

One limitation of this study relates to the study sample. Firstly, the relatively small sample size reduces the statistical power of tests, which makes it more difficult to detect significant effect sizes. A small sample size in regression can also result in random data showing a seemingly strong effect (Field, 2009). Moreover, the sample size limits the generalizability of the study results. It is also important to note that the scale used to assess past 12-month life stress exposure (i.e. LESS) was only introduced in this study approximately six months after the beginning of data collection. Therefore, only a subset of the GD group and healthy control

group completed this measure. Due to the small subsample size, results regarding past 12-month life stress exposure should be interpreted with caution. However, this study sample is similar in size to many other important studies in the field of GD (e.g. D. W. T. Black & Moyer, 1998; Jacobs, 2008; Specker, Carlson, Edmonson, Johnson, & Marcotte, 1996; Taber, McCormick, & Ramirez, 1987). In addition, a statistician was consulted who advised that the planned statistical methods could be used despite the small sample size. Future studies within the research project in which this study was embedded will likely be able to generate larger samples. Secondly, as described in the *Method* chapter, this study sample cannot be considered representative of the population of GD patients in South Africa in general (see Sinclair, Pasche, Pretorius, & Stein, 2014) which may reduce the external validity of the study. However, attempts were made to recruit participants from all local (South African) contexts, e.g. recruitment and assessments in Cape Town and surrounds, as well as in Pretoria and Johannesburg (Gauteng).

Thirdly, there were notable differences between the GD group and the healthy control group with regards to demographic variables such as population group and level of education. As discussed previously (see 3.3 *Sampling*), the population distribution in this study sample is not representative of the South African population. The high percentage of Coloured people in the current sample is likely due to the fact that the research was conducted in the Western Cape. Future research should focus on obtaining a more representative study sample for the population under investigation. In addition, level of education differed meaningfully between the two study groups. In this study sample, the highest level of education for most GD patients was Grade 12 or less, whereas most healthy controls had completed tertiary education. This study setup may have implications for the findings of the study in that the predictive effect of educational level on group membership (i.e. the presence or absence of GD) may be open to question in this regard. However, this may not necessarily be a limitation in the study design. In another South African study with treatment-seeking GD patients ($N = 200$), the highest level of education for more than half (59%) of the GD sample was also Grade 12 or less (Sinclair et al., 2014), suggesting that there may be an association between a lower level of education and GD, irrespective of the study design. If possible, future work should prioritize matching GD patients with healthy controls from the same communities in order to control for environmental factors that may be associated with an increased likelihood of trauma exposure or should perhaps compare social and pathological gamblers.

Another possible limitation relates to the cultural validity of the CTQ in South Africa. Though the CTQ has been utilized without problems in previous research on childhood trauma in South Africa (Brooks et al., 2015; Jewkes, Dunkle, Nduna, Jama, & Puren, 2010; Lochner et al., 2002), there are some indications that experiences described as part of the ‘physical abuse’ subscale of the CTQ may be very common in some Black African families and may therefore not be conceptualized as abuse in these groups (Thombs et al., 2007). For example, in a sample of rural youth from the Eastern Cape province of South Africa ($N = 2782$), 74% of women and 85% of men reported frequent experiences of physical abuse in their childhood and adolescence (Jewkes et al., 2010). The term ‘physical abuse’ was used interchangeably with physical punishment, which was measured with items adapted from the CTQ, such as “I was punished at home by being beaten.”, “I was beaten at home with a belt or stick or whip or something else which was hard.” and “I was beaten at home so hard that it left a mark or bruise.” (Jewkes et al., 2010, p.839). In addition, in a validation study of the CTQ-SF in the United States, Black participants reported having been “punished with hard objects” at higher rates than Hispanic participants (Thombs et al., 2007). The authors conclude that individual CTQ questions that combine the constructs of physical abuse and physical discipline may result in Black Americans being over-identified as having experienced childhood *abuse*. In other words, the specificity of individual CTQ items may be limited in some African and other cultural groups, which needs to be borne in mind in the interpretation of study results on such populations, particularly if comparisons about levels of childhood trauma exposure are made across population groups. Nonetheless, it is worth emphasizing that measurement invariance has been shown for the CTQ total scale score across different cultural groups (Thombs et al., 2007). Although there were not many Black African participants in the current study sample, it seems probable that the same kinds of social and environmental problems may be prevalent in impoverished Coloured communities in South Africa. Generally, it could be considered a limitation to implement measures which were developed in a Euro-American context (i.e. CTQ, LESS) since these may not fully do justice to the culture- and context-specific symptomatology and life stressors experienced by some South Africans. However, these measures were selected in order to ensure that study results would be comparable with other international findings. It was therefore decided to leave the study measures largely unchanged, with the exception of altering of minor details such as wording that might have been unfamiliar to participants.

Given the high rates of comorbid major depression and substance use disorders within this GD patient group, the fact that comorbid disorders were not controlled for in the analyses

could represent another limitation of the study. Future work should include investigation of the impact of comorbidity on the relationship between childhood trauma and GD.

A further limitation involves the retrospective and self-report nature of some aspects of this study. This relates to the measurement of childhood trauma using the CTQ and stressful life events exposure using the LESS. Recall bias may have impacted on individual scores on the CTQ in particular. However, this tends to be a common method of assessing these life dimensions and there is little reason to assume that either group would have answered the items in a systematically biased manner.

Despite these limitations, there are also a number of strengths of this study. The number of men and women included in the study sample is approximately equal and similar to the ratio of men and women in studies conducted on other gambling populations (e.g. Hodgins et al., 2012; Hodgins, Mansley, & Thygesen, 2006; Petry, 2001). Similarly, the mean age of the sample is comparable to the mean age reported in other pathological gambling populations (e.g. Kausch et al., 2006; Petry & Steinberg, 2005). In addition, previous research on childhood trauma in GD has usually only included problem or pathological gamblers and, in some cases, other patient groups. In this study, a healthy control group was included that was tested under the same study conditions. This allowed for a more accurate comparison of group-related differences in respect of reported exposure to childhood trauma. Furthermore, this study did not only test for associations between childhood trauma and GD, it also examined this association more carefully by exploring total childhood trauma and its subtypes as predictors of GD, as well as considering other possible factors that might influence this relationship, i.e. recent stressful life events exposure. To the author's knowledge, this study is the first to include regression analyses to determine the ways in which different subtypes of childhood trauma predict problem or pathological gambling. Previous studies on childhood trauma in GD have only used childhood trauma in general (no subtypes) as a predictor (for example, Black et al., 2012; Hodgins et al., 2010). Moreover, the study was supported by the South African Responsible Gambling Foundation (SARGF). Clinicians working for the National Responsible Gambling Programme (NRGP) have made their patients and individuals calling the NRGF counselling line aware of this study and have made referrals of interested parties. The principal investigator of the project was also invited to share preliminary findings at the annual SARGF conference held in 2016.

5.3 Conclusions and future directions

In summary, this study found significantly higher rates of childhood trauma in patients with GD compared to healthy controls. Childhood trauma was also shown to be a significant predictor of the presence of GD, suggesting that childhood trauma may be a risk factor for the development of GD. However, contrary to expectations, childhood trauma was not significantly associated with gambling severity in the GD patient group. Physical neglect was identified as a subtype of childhood trauma which significantly predicted the presence of GD. While often overlooked in previous research, childhood neglect appears to play an important role in adult psychological functioning and may play a significant role in vulnerability to certain behavioural addictions, warranting further investigation. Results of this study also demonstrated that recent stressful life events may play a moderating role in the relationship between childhood trauma and GD in that high levels of recent stressful life events increased the likelihood of a diagnosis of GD, independent of the severity of childhood trauma experienced, suggesting that both childhood trauma and stressful life events are factors that potentially influence the development of GD.

As is evident from the results of this study, the association between childhood trauma and GD is not a simple one. The finding of increased prevalence rates of childhood trauma in GD (in this study) and increased childhood trauma in substance use disorders (other studies) potentially suggests similarities between behavioural and substance addictions and a shared vulnerability for addiction in the context of childhood trauma. In addition, there is some suggestion that different types of childhood trauma may predispose to different kinds of addictive behaviours and conditions. Further aetiological research with larger sample sizes is needed to consolidate these findings. The results of the study further indicate that childhood trauma may predict the development of GD, but not its severity. Future research should focus on other factors that might influence the severity of gambling-related problems and which can be addressed in the clinic.

In clinical practice, these study results highlight the importance of considering trauma history in addiction, as well as assessing the impact of recent stressful life events on symptomatology. Screening and assessment of childhood trauma in individuals seeking treatment for GD and other addictions is critical and may assist in the development of more effective treatment strategies and outcomes, as well as the early identification of at-risk groups for addiction. In addition, an assessment of current or recent life stressors would help to identify individuals

with high levels of current life stress and its precipitating and/or perpetuating influence on addiction pathology.

References

- Alvarez, J., Pavao, J., Baumrind, N., & Kimerling, R. (2007). The relationship between child abuse and adult obesity among California women. *American Journal of Preventive Medicine*, 33(1), 28–33. <https://doi.org/10.1016/j.amepre.2007.02.036>
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR*. Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2013a). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2013b). *Highlights of changes from DSM-IV-TR to DSM-5*. Retrieved from [http://www.dsm5.org/Documents/changes from dsm-iv-tr to dsm-5.pdf](http://www.dsm5.org/Documents/changes%20from%20dsm-iv-tr%20to%20dsm-5.pdf)
- Anselme, P., & Robinson, M. J. F. (2013). What motivates gambling behavior? Insight into dopamine's role. *Frontiers in Behavioral Neuroscience*, 7(December), 1–4. <https://doi.org/10.3389/fnbeh.2013.00182>
- Back, S., Dansky, B. S., Coffey, S. F., Saladin, M. E., Sonne, S., & Brady, K. T. (2000). Cocaine dependence with and without post-traumatic stress disorder: a comparison of substance use, trauma history and psychiatric comorbidity. *The American Journal on Addictions*, 9(1), 51–62.
- Barrett, E. L., Teesson, M., Chapman, C., Slade, T., Carragher, N., & Mills, K. (2015). Substance use and mental health consequences of childhood trauma: An epidemiological investigation. *Drug and Alcohol Dependence*, 146, e217–e218. <https://doi.org/10.1016/j.drugalcdep.2014.09.059>
- Bergevin, T., Gupta, R., Derevensky, J., & Kaufman, F. (2006). Adolescent gambling: Understanding the role of stress and coping. *Journal of Gambling Studies*, 22(2), 195–208. <https://doi.org/10.1007/s10899-006-9010-z>
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., ... Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, 27(2), 169–190. [https://doi.org/10.1016/S0145-2134\(02\)00541-0](https://doi.org/10.1016/S0145-2134(02)00541-0)
- Berridge, K. C. (2007). The debate over dopamine's role in reward: The case for incentive

- salience. *Psychopharmacology*, 191(3), 391–431. <https://doi.org/10.1007/s00213-006-0578-x>
- Black, D. W., & Moyer, T. (1998). Clinical features and psychiatric comorbidity of subjects with pathological gambling behavior. *Psychiatric Services*, 49(11), 1434–1439. <https://doi.org/10.1176/ps.49.11.1434>
- Black, D. W., Shaw, M. C., McCormick, B. A., & Allen, J. (2012). Marital status, childhood maltreatment, and family dysfunction: A controlled study of pathological gambling. *Journal of Clinical Psychiatry*, 73(10), 1293–1297. <https://doi.org/10.4088/JCP.12m07800>
- Brady, K. T., & Sonne, S. C. (1999). The role of stress in alcohol use, alcoholism treatment, and relapse. *Alcohol Research & Health*, 23(4), 263–271.
- Brockie, T. N., Dana-Sacco, G., Wallen, G. R., Wilcox, H. C., & Campbell, J. C. (2015). The relationship of adverse childhood experiences to PTSD, depression, poly-drug use and suicide attempt in reservation-based Native American adolescents and young adults. *American Journal of Community Psychology*, 55(3–4), 411–421. <https://doi.org/10.1007/s10464-015-9721-3>
- Brooks, S. J., Naidoo, V., Roos, A., Fouche, J.-P., Lochner, C., & Stein, D. J. (2015). Early-life adversity and orbitofrontal and cerebellar volumes in adults with obsessive-compulsive disorder: voxel-based morphometry study. *The British Journal of Psychiatry*, 18–20. <https://doi.org/10.1192/bjp.bp.114.162610>
- Brydges, N. M., Holmes, M. C., Harris, A. P., Cardinal, R. N., & Hall, J. (2015). Early life stress produces compulsive-like, but not impulsive, behavior in females. *Behavioral Neuroscience*, 129(3), 300–308. <https://doi.org/10.1037/bne0000059>
- Bryer, J., Nelson, B., Miller, J., & Kroll, P. (1987). Childhood sexual and physical abuse as factors in adult psychiatric illness. *American Journal of Psychiatry*, 144(11), 1426–1430. <https://doi.org/10.1176/ajp.144.11.1426>
- Carr, C. P., Martins, C. M. S., Stingel, A. M., Lemgruber, V. B., & Juruena, M. F. (2013). The role of early life stress in adult psychiatric disorders: A systematic review according to childhood trauma subtypes. *Journal of Nervous and Mental Disease*, 201(12), 1007–1020. <https://doi.org/10.1097/NMD.0000000000000049>

- Child Trends DataBank. (2016). *Child maltreatment*. Retrieved from https://www.childtrends.org/wp-content/uploads/2016/09/40_Child_Maltreatment.pdf
- Cloitre, M., Stolbach, B. C., Herman, J. L., Van Der Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). A developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress*, 22(5), 399–408. <https://doi.org/10.1002/jts.20444>
- Colman, I., Garad, Y., Zeng, Y., Naicker, K., Weeks, M., Patten, S. B., ... Wild, T. C. (2013). Stress and development of depression and heavy drinking in adulthood: Moderating effects of childhood trauma. *Social Psychiatry and Psychiatric Epidemiology*, 48(2), 265–274. <https://doi.org/10.1007/s00127-012-0531-8>
- Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78(1), 98–104. <https://doi.org/10.1037/0021-9010.78.1.98>
- Cuomo, C., Sarchiapone, M., Di Giannantonio, M., Mancini, M., Roy, A., Giannantonio, M. Di, ... Roy, A. (2008). Aggression, impulsivity, personality traits, and childhood trauma of prisoners with substance abuse and addiction. *The American Journal of Drug and Alcohol Abuse*, 34(3), 339–345. <https://doi.org/10.1080/00952990802010884>
- Dalbudak, E., Evren, C., Aldemir, S., & Evren, B. (2014). The severity of internet addiction risk and its relationship with the severity of borderline personality features, childhood traumas, dissociative experiences, depression and anxiety symptoms among Turkish university students. *Psychiatry Research*, 219(3), 577–582. <https://doi.org/10.1016/j.psychres.2014.02.032>
- Dion, J., Collin-Vézina, D., De La Sablonnière, M., Philippe-Labbé, M. P., & Giffard, T. (2010). An exploration of the connection between child sexual abuse and gambling in aboriginal communities. *International Journal of Mental Health and Addiction*, 8(2), 174–189. <https://doi.org/10.1007/s11469-009-9234-0>
- Dolan, M., & Whitworth, H. (2013). Childhood sexual abuse, adult psychiatric morbidity, and criminal outcomes in women assessed by medium secure forensic service. *Journal of Child Sexual Abuse*, 22(2), 191–208. <https://doi.org/10.1080/10538712.2013.751951>
- Dudeck, M., Vasic, N., Otte, S., Streb, J., Wingenfeld, K., Grabe, H. J., ... Spitzer, C. (2015).

- Factorial validity of the short form of the Childhood Trauma Questionnaire (CTQ–SF) in German psychiatric patients, inmates, and university students. *Psychological Reports*, 116(3), 685–703. <https://doi.org/10.2466/16.03.PR0.116k27w5>
- Duncan, K. A. (2005). The relationship between posttraumatic stress disorder and substance abuse in women with a history of childhood sexual abuse trauma. In G. R. Walz & R. K. Yep (Eds.), *VISTAS: Compelling perspectives on counseling* (pp. 275–277). Alexandria, VA: American Counseling Association.
- Duncan, R. D., Saunders, B. E., Kilpatrick, D. G., Hanson, R. F., & Resnick, H. S. (1996). Childhood physical assault as a risk factor for PTSD, depression, and substance abuse: findings from a national survey. *The American Journal of Orthopsychiatry*, 66(3), 437–448.
- Edwards, V. J., Holden, G. W., Felitti, V. J., & Anda, R. F. (2003). Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: Results from the Adverse Childhood Experiences Study. *American Journal of Psychiatry*, 160(8), 1453–1460. <https://doi.org/10.1176/appi.ajp.160.8.1453>
- Elman, I., Tschibelu, E., & Borsook, D. (2010). Gender differences in psychosocial stress and in its relationship to gambling urges in individuals with pathological gambling. *The American Journal on Addictions*, 19, 332–339. <https://doi.org/10.1080/10550887.2010.531671>
- Enoch, M.-A., Hodgkinson, C. A., Yuan, Q., Shen, P.-H., Goldman, D., & Roy, A. (2010). The influence of GABRA2, childhood trauma, and their interaction on alcohol, heroin, and cocaine dependence. *Biological Psychiatry*, 67(1), 20–27. <https://doi.org/10.1016/j.biopsych.2009.08.019>
- Farrugia, P. L., Mills, K. L., Barrett, E. L., Back, S. E., Teesson, M., Baker, A., ... Brady, K. T. (2011). Childhood trauma among individuals with co-morbid substance use and post traumatic stress disorder. *Mental Health and Substance Use : Dual Diagnosis*, 4(4), 314–326. <https://doi.org/10.1080/17523281.2011.598462>
- Felsher, J. R., Derevensky, J. L., & Gupta, R. (2010). Young adults with gambling problems: The impact of childhood maltreatment. *International Journal of Mental Health and Addiction*, 8(4), 545–556. <https://doi.org/10.1007/s11469-009-9230-4>

- Fetzner, M. G., McMillan, K. A., Sareen, J., & Asmundson, G. J. G. (2011). What is the association between traumatic life events and alcohol abuse/dependence in people with and without PTSD? Findings from a nationally representative sample. *Depression and Anxiety*, 28(8), 632–638. <https://doi.org/10.1002/da.20852>
- Field, A. (2009). *Discovering Statistics Using SPSS*. (3rd ed.). London: Sage Publications. <https://doi.org/10.1016/j.landurbplan.2008.06.008>
- Fullilove, M. T., Fullilove, R. E., Smith, M., Winkler, K., Michael, C., Panzer, P. G., & Wallace, R. (1993). Violence, trauma, and post-traumatic stress disorder among women drug users. *Journal of Traumatic Stress*, 6(4), 533–543. <https://doi.org/10.1007/BF00974321>
- Gerdner, A., & Allgulander, C. (2009). Psychometric properties of the Swedish version of the Childhood Trauma Questionnaire—Short Form (CTQ-SF). *Nordic Journal of Psychiatry*, 63(2), 160–170. <https://doi.org/10.1080/08039480802514366>
- Grant, J. E., Steinberg, M. A., Kim, S. W., Rounsaville, B. J., & Potenza, M. N. (2004). Preliminary validity and reliability testing of a structured clinical interview for pathological gambling. *Psychiatry Research*, 128(1), 79–88. <https://doi.org/10.1016/j.psychres.2004.05.006>
- Grassi-Oliveira, R., Cogo-Moreira, H., Salum, G. A., Brietzke, E., Viola, T. W., Manfro, G. G., ... Arteche, A. X. (2014). Childhood Trauma Questionnaire (CTQ) in Brazilian samples of different age groups: Findings from confirmatory factor analysis. *PLoS ONE*, 9(1). <https://doi.org/10.1371/journal.pone.0087118>
- Hamilton, M. (1959). The assessment of anxiety states by rating. *British Journal of Medical Psychology*, 32(1), 50–55. <https://doi.org/10.1111/j.2044-8341.1959.tb00467.x>
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry*, 23, 56–62. <https://doi.org/10.1136/jnnp.23.1.56>
- Hammen, C., Henry, R., & Daley, S. E. (2000). Depression and sensitization to stressors among young women as a function of childhood adversity. *Journal of Consulting and Clinical Psychology*, 68(5), 782–787. <https://doi.org/10.1037//0022-006X.68.5.782>
- Harmon, D. K., Masuda, M., & Holmes, T. H. (1970). The social readjustment rating scale: A cross-cultural study of Western Europeans and Americans. *Journal of Psychosomatic*

- Research*, 14(4), 391–400. [https://doi.org/10.1016/0022-3999\(70\)90007-3](https://doi.org/10.1016/0022-3999(70)90007-3)
- Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, 112(1), 64–105.
- Heim, C., & Nemeroff, C. B. (2001). The role of childhood trauma in the neurobiology of mood and anxiety disorders: Preclinical and clinical studies. *Biological Psychiatry*, 49(12), 1023–1039. [https://doi.org/10.1016/S0006-3223\(01\)01157-X](https://doi.org/10.1016/S0006-3223(01)01157-X)
- Heim, C., Newport, D. J., Heit, S., Graham, Y. P., Wilcox, M., Bonsall, R., ... Nemeroff, C. B. (2000). Pituitary-adrenal and autonomic responses to stress in women after sexual and physical abuse in childhood. *JAMA: Journal of the American Medical Association*, 284(5), 592–597. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=eoah&AN=27485852&site=pdf-live>
- Hildyard, K. L., & Wolfe, D. A. (2002). Child neglect: Developmental issues and outcomes. *Child Abuse and Neglect*, 26(6–7), 679–695. [https://doi.org/10.1016/S0145-2134\(02\)00341-1](https://doi.org/10.1016/S0145-2134(02)00341-1)
- Hodgins, D. C., Mansley, C., & Thygesen, K. (2006). Risk factors for suicide ideation and attempts among pathological gamblers. *The American Journal on Addictions*, 15(4), 303–310. <https://doi.org/10.1080/10550490600754366>
- Hodgins, D. C., Schopflocher, D. P., El-Guebaly, N., Casey, D. M., Smith, G. J., Williams, R. J., & Wood, R. T. (2010). The association between childhood maltreatment and gambling problems in a community sample of adult men and women. *Psychology of Addictive Behaviors : Journal of the Society of Psychologists in Addictive Behaviors*, 24(3), 548–554. <https://doi.org/10.1037/a0019946>
- Hodgins, D. C., Schopflocher, D. P., Martin, C. R., El-Guebaly, N., Casey, D. M., Currie, S. R., ... Williams, R. J. (2012). Disordered gambling among higher-frequency gamblers: who is at risk? *Psychological Medicine*, 42(11), 2433–2444. <https://doi.org/10.1017/S0033291712000724>
- Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research*, 11(2), 213–218. [https://doi.org/10.1016/0022-3999\(67\)90010-](https://doi.org/10.1016/0022-3999(67)90010-)

- Hughes, K., Lowey, H., Quigg, Z., & Bellis, M. A. (2016). Relationships between adverse childhood experiences and adult mental well-being: results from an English national household survey. *BMC Public Health*, 16(1), 222. <https://doi.org/10.1186/s12889-016-2906-3>
- Imperator, C., Innamorati, M., Bersani, F. S., Imbimbo, F., Pompili, M., Contardi, A., & Farina, B. (2015). The association among childhood trauma, pathological dissociation and gambling severity in casino gamblers. *Clinical Psychology & Psychotherapy*. <https://doi.org/10.1002/cpp.1997>
- Jacobs, D. F. (1986). A general theory of addictions: A new theoretical model. *Journal of Gambling Behavior*, 2(1), 15–31.
- Jacobs, D. F. (2008). Growth of Aboriginal casinos in North America: Future prospects. Paper presented at the Responsible Gambling Council Discovery 2008 Conference.
- Jewkes, R. K., Dunkle, K., Nduna, M., Jama, P. N., & Puren, A. (2010). Associations between childhood adversity and depression, substance abuse and HIV and HSV2 incident infections in rural South African youth. *Child Abuse and Neglect*, 34(11), 833–841. <https://doi.org/10.1016/j.chiabu.2010.05.002>
- Kaminer, D., & Eagle, G. (2010). *Traumatic Stress in South Africa*. Johannesburg: Wits University Press.
- Kaminer, D., Grimsrud, A., Myer, L., Stein, D. J., & Williams, D. R. (2008). Risk for post-traumatic stress disorder associated with different forms of interpersonal violence in South Africa. *Social Science and Medicine*, 67(10), 1589–1595. <https://doi.org/10.1016/j.socscimed.2008.07.023>
- Kausch, O., Rugle, L., & Rowland, D. Y. (2006). Lifetime histories of trauma among pathological gamblers. *American Journal on Addictions*, 15(1), 35–43. <https://doi.org/10.1080/10550490500419045>
- Kaysen, D., Resick, P. a, & Wise, D. (2003). Living in danger: The impact of chronic traumatization and the traumatic context on posttraumatic stress disorder. *Trauma, Violence, & Abuse*, 4(3), 247–264. <https://doi.org/10.1177/1524838003253302>
- Kendler, K. S., Bulik, C. M., Silberg, J., Hettema, J. M., Myers, J., & Prescott, C. A. (2000).

- Childhood sexual abuse and adult psychiatric and substance use disorders in women. *Archives of General Psychiatry*, 57, 953–959.
<https://doi.org/10.1001/archpsyc.57.10.953>
- Kessler, R. C., Calabrese, J. R., Farley, P. a., Gruber, M. J., Jewell, M. a., Katon, W., ... Wittchen, H.-U. (2012). Composite International Diagnostic Interview screening scales for DSM-IV anxiety and mood disorders. *Psychological Medicine*, 1–13.
<https://doi.org/10.1017/S0033291712002334>
- Kessler, R. C., Davis, C. G., & Kendler, K. S. (1997). Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychological Medicine*, 27(5), 1101–1119.
- Kline, P. (1999). *The Handbook of Psychological Testing* (2nd Editio). London: Routledge.
- Komaroff, A. L., Masuda, M., & Holmes, T. H. (1968). The social readjustment rating scale: A comparative study. *Journal of Psychosomatic Research*, 12(2), 121–128.
- Lane, W., Sacco, P., Downton, K., Ludeman, E., Levy, L., & Tracy, J. K. (2016). Child maltreatment and problem gambling: A systematic review. *Child Abuse and Neglect*, 58, 24–38. <https://doi.org/10.1016/j.chiabu.2016.06.003>
- Langewisch, M. W. (2005). *Gambling in older adults: Factors associated with problem gambling behaviour in older adults. Dissertation Abstracts International: Section B: The Sciences and Engineering*. ProQuest Information & Learning, US. Retrieved from <http://0-search.ebscohost.com/innopac.wits.ac.za/login.aspx?direct=true&db=psych&AN=2005-99002-407&site=ehost-live&scope=site>
- Larsen, C. V., Curtis, T., & Bjerregaard, P. (2013). Gambling behavior and problem gambling reflecting social transition and traumatic childhood events among Greenland Inuit: A cross-sectional study in a large indigenous population undergoing rapid change. *Journal of Gambling Studies*, 29(4), 733–748. <https://doi.org/10.1007/s10899-012-9337-6>
- Ledgerwood, D. M., & Petry, N. M. (2006). Posttraumatic stress disorder symptoms in treatment-seeking pathological gamblers. *Journal of Traumatic Stress*, 19(3), 411–416. <https://doi.org/10.1002/jts.20123>
- Lei, H., & Skinner, H. A. (1980). A psychometric study of life events and social readjustment.

Journal of Psychosomatic Research, 24(2), 57–65.

- Leppink, E. W., & Grant, J. E. (2015). Traumatic event exposure and gambling: Associations with clinical, neurocognitive, and personality variables. *Annals of Clinical Psychiatry*, 27(1), 16–24.
- Lesieur, H. R., & Blume, S. B. (1987). The South Oaks Gambling Screen (SOGS): A new instrument for the identification of Pathological gamblers. *American Journal of Psychiatry*, 144(9), 1184–1188. <https://doi.org/10.1176/ajp.144.9.1184>
- Li, C. R., & Sinha, R. (2008). Inhibitory control and emotional stress regulation: Neuroimaging evidence for frontal-limbic dysfunction in psycho-stimulant addiction. *Neuroscience and Biobehavioral Reviews*, 32(3), 581–597. <https://doi.org/10.1016/j.jacc.2007.01.076>. White
- Lochner, C., Du Toit, P. L., Zungu-Dirwayi, N., Marais, A., Van Kradenburg, J., Seedat, S., ... Stein, D. J. (2002). Childhood trauma in obsessive-compulsive disorder, trichotillomania, and controls. *Depression and Anxiety*, 15(2), 66–68. <https://doi.org/10.1002/da.10028>
- Lochner, C., Seedat, S., Allgulander, C., Kidd, M., Stein, D., & Gerdner, A. (2010). Childhood trauma in adults with social anxiety disorder and panic disorder: a cross-national study. *African Journal of Psychiatry*, 13(5), 376–381. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21390408>
- Lopez-Patton, M., Kumar, M., Jones, D., Fonseca, M., Kumar, A. M., & Nemeroff, C. B. (2015). Childhood trauma and METH abuse among men who have sex with men: Implications for intervention. *Journal of Psychiatric Research*, 72, 1–5. <https://doi.org/10.1016/j.jpsychires.2015.09.009>
- Lumley, T., Diehr, P., Emerson, S., & Chen, L. (2002). The importance of the normality assumption in large public health data sets. *Annual Reviews of Public Health*, 23, 151–169. <https://doi.org/10.1146/annurev.publhealth.23.100901.140546>
- Malinosky-Rummell, R., & Hansen, D. J. (1993). Long-term consequences of childhood physical abuse. *Psychological Bulletin*, 114(1), 68–79.
- McCauley, J. (1997). Clinical characteristics of women with a history of childhood abuse: unhealed wounds. *JAMA: The Journal of the American Medical Association*, 277(17),

- 1362–1368. <https://doi.org/10.1001/jama.277.17.1362>
- McCormick, J., Delfabbro, P., & Denson, L. A. (2012). Psychological vulnerability and problem gambling: An application of Durand Jacobs' General Theory of Addictions to electronic gaming machine playing in Australia. *Journal of Gambling Studies*, 28(4), 665–690. <https://doi.org/10.1007/s10899-011-9281-x>
- McLaughlin, K. A., Conron, K. J., Koenen, K. C., & Gilman, S. E. (2010). Childhood adversity, adult stressful life events, and risk of past-year psychiatric disorder: A test of the stress sensitization hypothesis in a population-based sample of adults. *Psychological Medicine*, 40(10), 1647–1658. <https://doi.org/10.1017/S0033291709992121>
- McLellan, A. T., Kushner, H., Metzger, D., Peters, R., Smith, I., Grissom, G., ... Argeriou, M. (1992). The fifth edition of the Addiction Severity Index. *Journal of Substance Abuse Treatment*, 9(3), 199–213. [https://doi.org/10.1016/0740-5472\(92\)90062-S](https://doi.org/10.1016/0740-5472(92)90062-S)
- McPherson, S., Clayton, S., Wood, H., Hiskey, S., & Andrews, L. (2013). The role of childhood experiences in the development of sexual compulsivity. *Sexual Addiction & Compulsivity*, 20(4), 259–278. <https://doi.org/10.1080/10720162.2013.803213>
- Meade, C. S., Watt, M., Sikkema, K., Deng, L. X., Ranby, K. W., Skinner, D., ... Kalichmann, S. C. (2012). Methamphetamine use is associated with childhood sexual abuse and HIV sexual risk behaviors among patrons of alcohol-serving venues in Cape Town, South Africa. *Drug and Alcohol Dependence*, 126, 232–239. <https://doi.org/10.1016/j.drugalcdep.2012.05.024>
- Najavits, L. M., Gastfriend, D. R., Barber, J. P., Reif, S., Muenz, L. R., Blaine, J., ... Weiss, R. D. (1998). Cocaine dependence with and without PTSD among subjects in the National Institute on Drug Abuse Collaborative Cocaine Treatment Study. *American Journal of Psychiatry*, 155(2), 214–219. <https://doi.org/10.1176/ajp.155.2.214>
- National Centre for the Study of Gambling. (2006). *The National Prevalence Study 2006*. Retrieved from [http://www.responsiblegambling.co.za/media/user/documents/NRGP Prevalence Study 2006.pdf](http://www.responsiblegambling.co.za/media/user/documents/NRGP%20Prevalence%20Study%202006.pdf)
- National Sexual Violence Resource Center. (2010). *What is Sexual Violence?* <https://doi.org/10.1016/S0020-7292>
- Nemeroff, C. B. (2016). Paradise Lost: The neurobiological and clinical consequences of

- child abuse and neglect. *Neuron*, 89(5), 892–909.
<https://doi.org/10.1016/j.neuron.2016.01.019>
- Nixon, G., Evans, K., Grant Kalischuk, R., Solowoniuk, J., McCallum, K., & Hagen, B. (2012). Female gambling, trauma, and the not good enough self: An interpretative phenomenological analysis. *International Journal of Mental Health and Addiction*, 11(2), 214–231. <https://doi.org/10.1007/s11469-012-9413-2>
- Pallanti, S., DeCaria, C. M., Grant, J. E., Urpe, M., & Hollander, E. (2005). Reliability and validity of the pathological gambling adaptation of the Yale-Brown Obsessive-Compulsive Scale (PG-YBOCS). *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 21(4), 431–443. <https://doi.org/10.1007/s10899-005-5557-3>
- Palmisano, G. L., Innamorati, M., & Vanderlinden, J. (2016). Life adverse experiences in relation with obesity and binge eating disorder: A systematic review. *Journal of Behavioral Addictions*, 5(1), 11–31. <https://doi.org/10.1556/2006.5.2016.018>
- Pessiglione, M., Schmidt, L., Draganski, B., Kalisch, R., Lau, H., Dolan, R. J., & Frith, C. D. (2007). How the brain translates money into force: A neuroimaging study of subliminal motivation. *Science*, 316(5826), 904–906. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=eoah&AN=11836326&site=pf-live>
- Petry, N. M. (2001). Pathological gamblers, with and without substance use disorders, discount delayed rewards at high rates. *Journal of Abnormal Psychology*, 110(3), 482–487. <https://doi.org/10.1037//0021-843X>
- Petry, N. M., & Steinberg, K. L. (2005). Childhood maltreatment in male and female treatment-seeking pathological gamblers. *Psychology of Addictive Behaviors*, 19(2), 226–229. <https://doi.org/10.1037/0893-164X.19.2.226>
- Polusny, M. A., & Follette, V. M. (1995). Long-term correlates of child sexual abuse: Theory and review of the empirical literature. *Applied and Preventive Psychology*, 4(3), 143–166. [https://doi.org/10.1016/S0962-1849\(05\)80055-1](https://doi.org/10.1016/S0962-1849(05)80055-1)
- Pynoos, R. S., Steinberg, A. M., & Goenjian, A. (1996). Traumatic stress in childhood and adolescence: Recent developments and current controversies. In B. A. Van der Kolk, A.

- C. McFarlane, & L. Weisaeth (Eds.), *Traumatic stress: The effects of overwhelming experience on mind, body, and society* (pp. 331–358). New York: Guildford Press.
- Rabkin, J. G., & Struening, E. L. (1976). Life events, stress, and illness. *Science*, *194*, 1013–1020.
- Rahe, R. H., Biersner, R. J., Ryman, D. H., & Arthur, R. J. (1972). Psychosocial predictors of illness behavior and failure in stressful training. *Journal of Health and Social Behavior*, *13*(4), 393–397. <https://doi.org/10.2307/2136831>
- Rahe, R. H., Mahan Jr., J. L., & Arthur, R. J. (1970). Prediction of near-future health change from subjects' preceding life changes. *Journal of Psychosomatic Research*, *14*(4), 401–406. [https://doi.org/10.1016/0022-3999\(70\)90008-5](https://doi.org/10.1016/0022-3999(70)90008-5)
- Read, J., Van Os, J., Morrison, A. P., & Ross, C. A. (2005). Childhood trauma, psychosis and schizophrenia: A literature review with theoretical and clinical implications. *Acta Psychiatrica Scandinavica*, *112*(5), 330–350. <https://doi.org/10.1111/j.1600-0447.2005.00634.x>
- Robins, L., Helzer, J., Cottler, L., & Goldring, E. (1988). *NIMH Diagnostic Interview Schedule Version III Revised (DIS-III-R)*. St. Louis (MO): Department of Psychiatry, Washington University School of Medicine.
- Rowan, A. B., & Foy, D. W. (1993). Post-traumatic stress disorder in child sexual abuse survivors: A literature review. *Journal of Traumatic Stress*, *6*(1), 3–20. <https://doi.org/10.1007/BF02093359>
- Scher, C. D., Stein, M. B., Asmundson, G. J. G., McCreary, D. R., & Forde, D. R. (2001). The Childhood Trauma Questionnaire in a community sample: Psychometric properties and normative data. *Journal of Traumatic Stress*, *14*(4), 843–857.
- Scherrer, J. F., Xian, H., Kapp, J. M. K., Waterman, B., Shah, K. R., Volberg, R., & Eisen, S. A. (2007). Association between exposure to childhood and lifetime traumatic events and lifetime pathological gambling in a twin cohort. *The Journal of Nervous and Mental Disease*, *195*(1), 72–78. <https://doi.org/10.1097/01.nmd.0000252384.20382.e9>
- Shaham, Y., Erb, S., & Stewart, J. (2000). Stress-induced relapse to heroin and cocaine seeking in rats: A review. *Brain Research Reviews*, *33*, 13–33. [https://doi.org/10.1016/S0165-0173\(00\)00024-2](https://doi.org/10.1016/S0165-0173(00)00024-2)

- Sheehan, D., Janavs, J., Baker, R., Harnett-Sheehan, K., Knapp, E., Sheehan, M., ... Lepine, J. P. (2006). *Mini International Neuropsychiatric Interview Version 5.0.0 DSM-IV*. Sheehan DV & Lecrubier Y. Retrieved from http://narr.bmap.ucla.edu/docs/MINI_v5_002006.pdf
- Sheehan, D., Lecrubier, Y., Sheehan, H., Amorim, P., Janavs, J., Weiller, E., ... Dunbar, G. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, (59 [suppl 20]), 22–33.
- Sinclair, H., Pasche, S., Pretorius, A., & Stein, D. J. (2014). *Clinical Profile and Psychiatric Comorbidity of Treatment-Seeking Individuals with Pathological Gambling in South-Africa*. *Journal of Gambling Studies*. <https://doi.org/10.1007/s10899-014-9516-8>
- Specker, S. M., Carlson, G. A., Edmonson, K. M., Johnson, P. E., & Marcotte, M. (1996). Psychopathology in pathological gamblers seeking treatment. *Journal of Gambling Studies*, 12(1), 67–81. <https://doi.org/10.1007/BF01533190>
- Spinhoven, P., Penninx, B. W., Hickendorff, M., van Hemert, A. M., Bernstein, D. P., & Elzinga, B. M. (2014). Childhood Trauma Questionnaire: Factor structure, measurement invariance, and validity across emotional disorders. *Psychological Assessment*, 26(3), 717–729. <https://doi.org/10.1037/pas0000002>
- Stein, M. B., Walker, J. R., Ross, C. A., Anderson, G., Forde, D. R., & Hazen, L. (1996). Childhood physical and sexual abuse in patients with anxiety disorders and in a community sample. *American Journal of Psychiatry*, 153(2), 275–277.
- Stewart, J. (2000). Pathways to relapse: the neurobiology of drug- and stress-induced relapse to drug-taking. *Journal of Psychiatry & Neuroscience*, 25(2), 125–136.
- Stoltenborgh, M., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2013). The neglect of child neglect: A meta-analytic review of the prevalence of neglect. *Social Psychiatry and Psychiatric Epidemiology*, 48(3), 345–355. <https://doi.org/10.1007/s00127-012-0549-y>
- Storr, C. L., Lee, G. P., Derevensky, J. L., Ialongo, N. S., & Martins, S. S. (2012). Gambling and adverse life events among urban adolescents. *J Gambl Stud*, 28(2), 325–336. <https://doi.org/10.1007/s10899-011-9254-0>

- Streiner, D. L. (2003). Starting at the Beginning : An Introduction to Coefficient Alpha and Internal Consistency Starting at the Beginning : An Introduction to Coefficient Alpha and Internal Consistency. *Journal of Personality Assessment*, 80(1), 99–103.
<https://doi.org/10.1207/S15327752JPA8001>
- Taber, J. I., McCormick, R. A., & Ramirez, L. F. (1987). The prevalence and impact of major life stressors among pathological gamblers. *The International Journal of the Addictions*, 22(1), 71–79.
- The Centre for Justice and Crime Prevention. (2015). The Optimus Study on Child Abuse, Violence and Neglect in South Africa. *UCT Communication and Marketing Department*. Retrieved from https://www.uct.ac.za/usr/press/2015/OptimusStudy_31July2015.pdf
- Thombs, B. D., Lewis, C., Bernstein, D. P., Medrano, M. A., & Hatch, J. P. (2007). An evaluation of the measurement equivalence of the Childhood Trauma Questionnaire-Short Form across gender and race in a sample of drug-abusing adults. *Journal of Psychosomatic Research*, 63(4), 391–398.
<https://doi.org/10.1016/j.jpsychores.2007.04.010>
- Tracy, N. (2016). *Emotional abuse: Definitions, signs, symptoms, examples*. Retrieved from <https://www.healthyplace.com/abuse/emotional-psychological-abuse/emotional-abuse-definitions-signs-symptoms-examples>
- Turney, D., & Tanner, K. (2005). Understanding and working with neglect. *Research in Practice: Every Child Matters Research Briefings*, 10, 1–8.
- Van Den Broeck, J., Cunningham, S. A., Eeckels, R., & Herbst, K. (2005). Data cleaning: Detecting, diagnosing, and editing data abnormalities. *PLoS Medicine*, 2(10), 0966–0970. <https://doi.org/10.1371/journal.pmed.0020267>
- Walker, E. A., Katon, W. J., Hansom, J., Harrop-Griffiths, J., Holm, L., Jones, M. L., ... Jemelka, R. P. (1992). Medical and psychiatric symptoms in women with childhood sexual abuse. *Psychosomatic Medicine*, 54(6), 658–664.
- Waller, N., Putnam, F. W., & Carlson, E. B. (1996). Types of dissociation and dissociative types: A taxometric analysis of dissociative experiences. *Psychological Methods*, 1(3), 300–321. <https://doi.org/10.1037/1082-989X.1.3.300>
- Widom, C. S., DuMont, K., & Czaja, S. J. (2007). A prospective investigation of major

depressive disorder and comorbidity in abused and neglected children grown up.
Archives of General Psychiatry, 64, 49–56.

Williams, D. R., Herman, A., Stein, D. J., Heeringa, S. G., Jackson, P. B., Moomal, H., & Kessler, R. C. (2008). Twelve-month mental disorders in South Africa: prevalence, service use and demographic correlates in the population-based South African Stress and Health Study. *Psychological Medicine*, 38(2), 211–220.
<https://doi.org/10.1017/S0033291707001420>.Twelve-month

Wonderlich, S. A., Crosby, R. D., Mitchell, J. E., Thompson, K. M., Redlin, J., Demuth, G., ... Haseltine, B. (2001). Eating disturbance and sexual trauma in childhood and adulthood. *International Journal of Eating Disorders*, 30(4), 401–412.
<https://doi.org/10.1002/eat.1101>

Wong, I. L. K., & So, E. M. T. (2003). Prevalence estimates of problem and pathological gambling in Hong Kong. *American Journal of Psychiatry*, 160(7), 1353–1354.
<https://doi.org/10.1176/appi.ajp.160.7.1353>

World Health Organization. (2017). Child Maltreatment.
<https://doi.org/10.1001/jamapediatrics.2013.42.3>.

Zanarini, M. C. (1992). *Revised Childhood Experiences Questionnaire (CEQ-R)*. Belmont (MA): McLean Hospital, Harvard Medical School.

Appendix

Appendix A

DSM-5 Diagnostic Criteria: Gambling Disorder

** For informational purposes only **

- A. Persistent and recurrent problematic gambling behavior leading to clinically significant impairment or distress, as indicated by the individual exhibiting four (or more) of the following in a 12-month period:
- a. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
 - b. Is restless or irritable when attempting to cut down or stop gambling.
 - c. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
 - d. Is often preoccupied with gambling (e.g., having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
 - e. Often gambles when feeling distressed (e.g., helpless, guilty, anxious, depressed).
 - f. After losing money gambling, often returns another day to get even ("chasing" one's losses).
 - g. Lies to conceal the extent of involvement with gambling.
 - h. Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
 - i. Relies on others to provide money to relieve desperate financial situations caused by gambling.
- B. The gambling behavior is not better explained by a manic episode.

Specify if:

Episodic: Meeting diagnostic criteria at more than one time point, with symptoms subsiding between periods of gambling disorder for at least several months.

Persistent: Experiencing continuous symptoms, to meet diagnostic criteria for multiple years.

Specify if:

In early remission: After full criteria for gambling disorder were previously met, none of the criteria for gambling disorder have been met for at least 3 months but for less than 12 months.

In sustained remission: After full criteria for gambling disorder were previously met, none of the criteria for gambling disorder have been met during a period of 12 months or longer.

Specify current severity:

Mild: 4–5 criteria met.

Moderate: 6–7 criteria met.

Severe: 8–9 criteria met.

From the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (section 312.31).

Appendix B

Patient Name		Date			
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Childhood Trauma Questionnaire – Short Form (CTQ-SF)

Copyright 1996 David P. Bernstein, Ph.D., Laura Fink, Ph.D.

Instructions: These questions ask about some of your experiences growing up as a child and a teenager. For each question, circle the number that best describes how you feel. Although some of these questions are of a personal nature, please try to answer as honestly as you can. Your answers will be kept confidential.

When I was growing up, ...	Never True	Rarely True	Sometimes True	Often True	Very Often True
1. I didn't have enough to eat.	1	2	3	4	5
2. I knew there was someone to take care of me and protect me	1	2	3	4	5
3. People in my family called me things like "stupid", "lazy", or "ugly".	1	2	3	4	5
4. My parents were too drunk or high to take care of me.	1	2	3	4	5
5. There was someone in my family who helped me feel important or special.	1	2	3	4	5
6. I had to wear dirty clothes.	1	2	3	4	5
7. I felt loved.	1	2	3	4	5
8. I thought that my parents wished I had never been born.	1	2	3	4	5
9. I got hit so hard by someone in my family that I had to see a doctor or go to the hospital.	1	2	3	4	5
10. There was nothing I wanted to change about my family.	1	2	3	4	5
11. People in my family hit me so hard that it left bruises or marks.	1	2	3	4	5
12. I was punished with a belt, a board, a cord, or some hard object.	1	2	3	4	5
13. People in my family looked out for each other.	1	2	3	4	5
14. People in my family said hurtful or insulting things to me.	1	2	3	4	5
15. I believe that I was physically abused.	1	2	3	4	5
16. I had the perfect childhood.	1	2	3	4	5
17. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbour, or doctor.	1	2	3	4	5
18. I felt that someone in my family hated me.	1	2	3	4	5
19. People in my family felt close to each other.	1	2	3	4	5
20. Someone tried to touch me in a sexual way, or tried to make me touch them.	1	2	3	4	5
21. Someone threatened to hurt me or tell lies about me unless I did something sexual with them.	1	2	3	4	5
22. I had the best family in the world.	1	2	3	4	5
23. Someone tried to make me do sexual things or make me watch sexual things.	1	2	3	4	5
24. Someone molested me.	1	2	3	4	5
25. I believe that I was emotionally abused.	1	2	3	4	5
26. There was someone to take me to the doctor if I needed it.	1	2	3	4	5
27. I believe that I was sexually abused	1	2	3	4	5
28. My family was a source of strength and support.	1	2	3	4	5

Appendix C

Life Event Stress Scale

In the past 12 months, which of the following *major life events* have taken place in your life?

Ø Make a check mark next to each event that you have experienced this year.

Event Stress Scores

☐ Death of Spouse	100
☐ Divorce	73
☐ Marital Separation	65
☐ Jail Term	63
☐ Death of close family member	63
☐ Personal injury or illness	53
☐ Marriage	50
☐ Fired from work	47
☐ Marital reconciliation	45
☐ Retirement	45
☐ Change in family member's health	44
☐ Pregnancy	40
☐ Sex difficulties	39
☐ Addition to family	39
☐ Business readjustment	39
☐ Change in financial status	38
☐ Death of close friend	37
☐ Change to a different line of work	36
☐ Change in number of marital arguments	35
☐ Mortgage or loan over \$10,000	31
☐ Foreclosure of mortgage or loan	30
☐ Change in work responsibilities	29
☐ Trouble with inlaws	29
☐ Outstanding personal achievement	28
☐ Spouse begins or stops work	26

___ Starting or finishing school	26
___ Change in living conditions	25
___ Revision of personal habits	24
___ Trouble with boss	23
___ Change in work hours, conditions	20
___ Change in residence	20
___ Change in schools	20
___ Change in recreational habits	19
___ Change in church activities	19
___ Change in social activities	18
___ Mortgage or loan under \$10,000	17
___ Change in sleeping habits	16
___ Change in number of family gatherings	15
___ Change in eating habits	15
___ Vacation	13
___ Christmas season	12
___ Minor violation of the law	11
Total score: _____	

Appendix D



UNIVERSITEIT STELLENBOSCH-UNIVERSITY
Job kennisverreë + your knowledge partner

Approved with Stipulations Response to Modifications- (New Application)

29-Oct-2014
Lochner, Christine C

Ethics Reference #: N14/05/053

Title: Gambling disorder: A neurocognitive, genetic and neuroimaging study.

Dear Professor Christine Lochner,

The **Response to Modifications - (New Application)** received on 19-Sep-2014, was reviewed by members of Health Research Ethics Committee 1 via Expedited review procedures on 29-Oct-2014.

Please note the following information about your approved research protocol:

Protocol Approval Period: 29-Oct-2014 -29-Oct-2015

The Stipulations of your ethics approval are as follows:

The ethics committee should be informed of any sharing of DNA samples with overseas collaborators.

Please remember to use your **protocol number** (N14/05/053) on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Please note a template of the progress report is obtainable on www.sun.ac.za/rds and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Translation of the consent document to the language applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372

Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health (healthres@pgwc.gov.za Tel: +27 21 483 9907) and Dr Helene Visser at City Health (Helene.Visser@capetown.gov.za Tel: +27 21 400 3981). Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and documents please visit: www.sun.ac.za/rds

If you have any questions or need further assistance, please contact the HREC office at 0219389657.

Included Documents:

Appendix E

 UNIVERSITY OF CAPE TOWN IKO-TO SIYI: BAKKAPA - indiboneli nam a-nyuse		FACULTY OF HEALTH SCIENCES Human Research Ethics Committee	
Form FHS006: Protocol Amendment		- 3 MAY 2016	
HREC office use only (FWA00001637; IRS00001938)		HEALTH SCIENCES FACULTY UNIVERSITY OF CAPE TOWN	
☒ Approved	☒ Type of review: Expedited	☐ Full committee	
This serves as notification that all changes and documentation described below are approved.			
Signature Chairperson of the HREC		Date: 4/5/2016	
Note: All major amendments should include a PI Synopsis justifying the changes for the amendment (please see notice dated 23 Apr 2012)			
Comments to PI from the HREC The HREC note that appropriate clinical referral will occur if deemed in the best interest of the patient. We thank you for the [signature] 4/5/2016			

Principal Investigator to complete the following:

1. Protocol Information

Date (when submitting this form)	26 April 2016		
HREC REF Number	770/2014		
Protocol title	Gambling disorder and methamphetamine use disorder: A neurocognitive, genetic and neuroimaging study		
Protocol number (if applicable)	N/A		
Principal Investigator	UCT: Prof. Dan Stein US: Prof Christine Lochner		
Department / Office Internal Mail Address	PI UCT: Dan.Stein@uct.ac.za PI US: cl2@sun.ac.za		
1.1 Is this a major or a minor amendment? (see FHS006h1a) Major (tick box) Minor (tick box)	☐ Major	☒ Minor	
1.2 Does this protocol receive US Federal funding?	☐ Yes	☒ No	
1.3 If the amendment is a major amendment and receives US Federal Funding, does the amendment require full committee approval?	☐ Yes	☒ No	

Appendix F

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (SCHOOL OF HUMAN & COMMUNITY DEVELOPMENT)

CLEARANCE CERTIFICATE

PROTOCOL NUMBER: MCH/IN/17/004 IH

PROJECT TITLE:

Childhood trauma and gambling disorder: A complex association

INVESTIGATORS

Henk Nelischa

DEPARTMENT

Psychology

DATE CONSIDERED

06/06/17

DECISION OF COMMITTEE

Approved

This ethical clearance is valid for 2 years and may be renewed upon application

DATE: 06 June 2017

CHAIRPERSON
(Prof. Carol Long)



cc Supervisor:

Prof. Gillian Burge
Psychology

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and one copy returned to the Secretary, Room 140015, 10th Floor, Senate House, University.

I/we fully understand the conditions under which I/we are authorized to carry out the aforementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure, as approved, I/we undertake to submit a revised protocol to the Committee.

This ethical clearance will expire on 31 December 2019

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix G



MRC Research Unit on Risk and Resilience in Mental Disorders

Dept of Psychiatry, University of Stellenbosch
PO Box 241, Cape Town, 8000 South Africa; Tel + 2721 938 9161, Fax + 2721 933 5790
<http://www.mrc.ac.za/anxiety/anxiety.htm>

DATE: 17 April 2017

TO: Chair of Human Research Ethics Committee (Non-Medical)
Human Research Ethics Committee (Non-Medical), University of Witwatersrand

FROM: Professor Christine Lochner, SU/UCT MRC Unit on Risk and Resilience in Mental Disorders, Department of Psychiatry, Stellenbosch University; cl2@sun.ac.za

RE: Permission for Use of Data

I, Prof Christine Lochner, Principal Investigator of a research project titled "Gambling disorder and methamphetamine use disorder: A neurocognitive, genetic and neuroimaging study" (SU HREC reference number N14/05/053; UCT HREC reference number: 770/2014), hereby give the postgraduate student, Ms Natascha Horak, permission to analyze aspects of the data collected during this research project expressly for her Master's thesis at the University of Witwatersrand, titled "Childhood trauma and gambling disorder: A complex association".

I confirm that all identifying variables present in the parent dataset have been removed, i.e. the student has received an anonymized data set. The student will not be given access to any participant identifiers.

The research project has been approved by the Health Research Ethics Committee at Stellenbosch University (HREC reference number: 14/05/053) and the Human Research Ethics Committee at the University of Cape Town (HREC reference number: 770/2014). It has been conducted according to international and locally accepted ethical guidelines for research, namely the Declaration of Helsinki, and the SA Department of Health's 2004 Guidelines: *Ethics in Health Research: Principles, Structures and Processes*.

Ms. Horak was part of this (still active) SU/UCT research protocol from October 2014 until November 2016 in her capacity as Research Assistant at the SU/UCT MRC Unit on Risk and Resilience in Mental Disorders, at the Department of Psychiatry at Stellenbosch University.

Yours sincerely,

Prof Christine Lochner
Co-Director

17 April 2017

Date

Director: Prof Dan J Stein

Appendix H

PARTICIPANT INFORMATION AND INFORMED CONSENT FORM (PATIENTS)

TITLE OF RESEARCH PROJECT: Gambling disorder **and methamphetamine use disorder:** A neurocognitive, genetic and neuroimaging study

REFERENCE NUMBERS: SU HREC: N14/05/053

UCT HREC: 770/2014

PRINCIPAL INVESTIGATORS: SU: Prof Christine Lochner

UCT: Prof Dan Stein

ADDRESS: MRC Unit on Anxiety & Stress Disorders, Department of Psychiatry, Faculty of Medicine and Health Sciences, Stellenbosch University

CONTACT NUMBERS: Lochner: 021 – 938 9179; Stein: 021 – 404 2174

We would like to invite you to participate in a research study that involves genetic analysis and possible long-term storage of blood or tissue specimens. Please take some time to read the information presented here which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part initially.

This research study has been approved by the **Health Research Ethics Committee at Stellenbosch University and the Human Research Ethics Committee at the University of Cape Town** and it will be conducted according to international and locally accepted ethical guidelines for research, namely the Declaration of Helsinki, and the SA Department of Health's 2004 Guidelines: *Ethics in Health Research: Principles, Structures and Processes*.

What is Genetic research?

Genetic material, also called DNA, is usually obtained from a small blood sample. Occasionally genetic material is obtained from other sources such as saliva. Genes are

found in every cell in the human body. Our genes determine what we look like and sometimes our susceptibility to certain kinds of diseases. Worldwide, researchers in the field of genetics are continuously discovering new information. This information may be of great benefit to both future generations and people today, who suffer from particular diseases or conditions.

What does this particular research study involve?

This study is part of a research project we are conducting to learn more about gambling disorder and methamphetamine use disorder.

Doctors and scientists at the MRC Unit on Anxiety and Stress Disorders, University of Stellenbosch, and the Department of Psychiatry, University of Cape Town, are collaborating with researchers from other research institutions worldwide to investigate the structure and functioning of selected brain areas in 40 individuals with gambling disorder and 40 individuals with methamphetamine use disorder. This study also aims to identify the genes that may increase the risk for the development of these conditions. Information from patients will be compared with 40 age- and gender-matched healthy controls.

This is not a treatment study. Information is being collected for research purposes only.

Why have you been invited to participate?

You have been invited to participate because you have indicated (either to your doctor, or to the National Responsible Gambling Programme's telephone counselling line which is affiliated with UCT's Addiction division) that you excessively gamble or use methamphetamine ("tik") to the extent that it affects your functioning.

Gambling disorder (GD) or pathological gambling can be defined as the inability to resist the urge to gamble despite severely negative personal or social consequences. Similarly, methamphetamine use disorder (MUD) refers to the inability to resist taking the drug, and is often associated with repeated unsuccessful attempts to cut down, resulting in a failure to fulfill major obligations at work, school or home.

What procedures will be involved in this research?

If you decide to participate, we will ask you to attend 2-4 sessions, each with a different study focus.

The first session will comprise an interview with a researcher and the drawing of bloods. These procedures will last approximately 3-4 hours (with a break in-between, if need be). Depending on the preferences of your treatment centre, this session may be broken up into two sessions and the drawing of bloods and completion of questionnaires may be conducted in a group setting. The clinical interview will, amongst other things, include a number of questions related to gambling or methamphetamine use and your prior psychiatric history. Approximately 48 ml (3 teaspoons) of blood will be drawn from your arm. We may need to contact you again to get another blood sample should we fail to get a DNA sample (the genetic material) from your blood. The blood sample you give may be used to create a cell line. A cell line is living tissue that can be used to make more of your DNA at any time in the future. Genetic material previously found to be associated with gambling disorder which may also play a role in brain activity, will also be investigated. This process will take place at the Division of Molecular Biology and Human Genetics, Faculty of Medicine and Health Sciences, at the University of Stellenbosch. Should you not wish to provide us with a blood sample, you may provide us with a saliva sample instead.

The second session will involve 2 hours of brain scanning followed by neuropsychological testing (i.e. computer based tasks to test abilities such as decision making) of approximately 1.5 hours' duration. This session may also be broken up into two sessions, depending on your or your treatment centre's preference, as well as transport availability. MRI (brain scanning) makes use of magnetic fields and radio waves to examine internal structures of the body. The procedure is non-invasive and completely harmless. No ionising radiation (such as X-rays) or radio-active material are used during the study. MRI is particularly useful for imaging soft tissue such as the brain. It is capable of measuring certain characteristics of brain function. The procedure requires that you lie on your back with your head in a "tunnel" which is very similar to a CAT scan machine. The tunnel is open on both sides and is well lit and ventilated. You will at all times be in intercom contact with the radiographer, who will also be able to see you at all times. The examination will take about 90 minutes (with breaks if needed) and will be accompanied by a series of loud knocking sounds. There are no moving parts within the scanner, and the knocking sounds occur due to vibration of the machine in the magnetic fields. In some instances, the intravenous administration of contrast agent is also necessary, but you will be notified in advance about this. Finally, it is important that you do not move at any stage during the examination as this makes the images blurry.

The initial screening and assessment of GD or MUD patients as well as the drawing of bloods will take place either at the National Responsible Gambling Programme (NRGP) offices in Kenilworth, at the Faculty of Medicine and Health Sciences at the Tygerberg

Campus of Stellenbosch University, or at the rehabilitation centre where you are currently being treated, depending on your preference for either location. The brain imaging will proceed at the recently established scanning centre at Groote Schuur Hospital (UCT). The computer-based tasks will proceed at the Faculty of Medicine and Health Sciences at the Tygerberg Campus of Stellenbosch University. You will receive grocery vouchers for participation and refreshments will be provided if requested. Where necessary, transport will also be provided.

We may contact you later for further information, or request you to complete another interview at a later date, in order to obtain follow-up information that may be of use in our genetic analyses. This may involve an assessment similar to the current assessment, including a series of interviews and/or another blood sample. Your current participation is in no way binding to your future participation.

Are there any risks involved in participation?

There are no more than minimal medical or psychological risks associated with this study. If you feel fatigued, uncomfortable, or in any way upset during any part of the session(s), you may ask to stop for a rest break or have the interview or scanning discontinued. The research interview does not take the place of a full psychiatric evaluation. You may experience some emotional discomfort when answering some questions. If any particular question makes you feel uncomfortable, you may discuss its importance with the specially trained interviewer. You may choose not to answer any question should you feel uncomfortable.

You may feel some pain associated with having blood drawn from a vein. You may experience discomfort, bruising and/or other bleeding at the site where the needle is inserted. Occasionally, some people experience fleeting dizziness or feel faint when their blood is drawn. Some insurance companies may mistakenly assume that your participation in this study is an indication that you are at higher risk of a genetic disease, and this could hurt your access to health or other insurance. We will not share any information about you, or your family, with an insurance company. It is the opinion of the investigators that participation in this study does not constitute genetic testing. Therefore, participation in this study should not be reported as genetic testing.

You may feel some discomfort or fatigue associated with being in the brain scanner or while undergoing neuropsychological testing.

Are there any benefits to your taking part in this study? Will the results of your participation be discussed with you?

This study will hopefully provide useful data about the nature of problem gambling in South Africa, potentially filling gaps in the current body of knowledge regarding gambling. Individuals who might develop one of these conditions in the future, their family members, and future generations may benefit from the project if we can locate the genes and brain structures or functions that may have led to these symptoms. That knowledge may then be used for prevention or treatment planning and policy purposes

Individuals who choose not to partake in this study are free to do so at no consequence and will be referred for treatment, if requested.

How long will your blood/DNA sample be stored and where will it be stored?

Samples will be safely stored at -80 degrees Celsius at the Division of Molecular Biology and Human Genetics, Faculty of Medicine and Health Sciences, at the University of Stellenbosch, and de-identified (identified by a code number), and access will be limited to authorised scientific investigators. We also collaborate with researchers abroad; this means we may in future share DNA samples and anonymous (clinical or imaging) information with these sites to study your condition.

Your DNA will be maintained permanently, unless you request to have it removed. If at any time in the future you wish to have your DNA or clinical data removed from the storage site, you may do so by contacting the researchers conducting this study.

Will the information obtained from your DNA be used for other research?

You can choose to share your DNA with other scientists through a central database. Other researchers would be able to learn from your sample and would be able to conduct studies that include DNA from many countries. This can lead to larger and better studies related to gambling disorder, methamphetamine use disorder and other health conditions.

An “online database” is a database that is created from the central database. Researchers all over the world have access to this database (this is called “data sharing”). The DNA stored in this online database will be used for research into general medical conditions OR psychiatric illnesses. If South African researchers wish to use your stored blood/DNA for additional research in this field they will be required to apply for permission to do so from the Health Research Ethics Committee at Stellenbosch University and the Human Research Ethics Committee at the University of Cape Town. If researchers from abroad wish to use your DNA information that has been stored on the online database, they will be required to

apply for permission to do so from the National Institute of Health in the United States of America. If you wish to withdraw your data or your sample in the future, this is possible. However, please note that by the time we withdraw your data or your sample, it may already have been shared with other researchers. The United States National Institute for Mental Health (NIMH) Repository would, however, then instruct researchers to destroy your data and your sample if requested.

How will your confidentiality be protected?

If you consent to participate in this study, your identity will be kept confidential. Your answers will not be shared with other family members or anyone else except for staff members involved in this study. All research information and laboratory samples obtained from you will be safely stored and identified by code number. This means that no identifying information will be shared. Access will be limited to authorised scientific investigators. Any publications resulting from this study will not identify you by name.

Because some of your DNA/cells are going to be stored in the United States, there is a very small chance the United States government might forcibly gain access to it using one of their laws called “The Patriot Act”. This Act is used when the United States government judges that access to DNA is important for security purposes.

Will you or the researchers benefit financially from this research?

You will not be paid to take part in this study although your travel expenses will be reimbursed. In addition to this, you will have the opportunity of winning some money in a monetary reward task. The exact amount you will receive is dependent on your performance on the task.

Is there anything else that you should know or do?

You can contact the principal investigator at Stellenbosch University, Christine Lochner, on 021 – 938 9179 or CL2@sun.ac.za, or the principal investigator at the University of Cape Town, Dan Stein, on 021 – 404 2164 or dan.stein@uct.ac.za, if you have any further queries or encounter any problems. You can contact the UCT Faculty of Health Sciences Human Research Ethics Committee at 021 – 406 6346 if you have any concerns or complaints that have not been adequately addressed by study staff.

Declaration by participant

By signing below, I agree to take part in a genetic research study entitled **Gambling disorder and methamphetamine use disorder: A neurocognitive, genetic and neuroimaging study.**

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is voluntary and I have not been pressurised to take part.
- I have received a signed duplicate copy of this consent form for my records.

Tick the option you choose:

☐ I agree to take part in the study and consent to my blood being drawn. My blood sample may be stored and used for the current research project. Please destroy my DNA sample as soon as the current research project has been completed.

OR

☐ I agree that my blood or DNA sample can be stored, but I can choose to request at any time that my stored sample be destroyed. I have the right to receive confirmation that my request has been carried out.

OR

☐ I agree that my blood or DNA sample can be made available on an online database for use by other researchers, but I can choose to request that my stored sample be destroyed by the NIMH Repository. I have the right to receive confirmation that my request has been carried out.

Signed at (place) on (date)

.....
Signature of participant

.....
Signature of witness

Declaration by investigator

I (*name*) declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research as discussed above.
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*)

Signed at (*place*) on (*date*)

.....

Signature of investigator

.....

Signature of witness

Declaration by interpreter

I (*name*) declare that:

- I assisted the investigator (*name*) to explain the information in this document to (*name of participant*) using the language medium of Afrikaans/Xhosa.
- We encouraged him/her to ask questions and took adequate time to answer them.
- I conveyed a factually correct version of what was related to me.
- I am satisfied that the participant fully understands the content of this informed consent document and has had all his/her question satisfactorily answered.

Signed at (*place*) on (*date*)

.....

Signature of interpreter

.....

Signature of witness