AN ASSESSMENT OF CHILDHOOD TRAUMA IN A GROUP OF STATE PATIENTS ADMITTED TO STERKFONTEIN HOSPITAL

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Medicine in the branch of Psychiatry

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DECLARATION

I, Nikki Eklektos, declare that this research report is my own work. It is being submitted for the degree of Master of Medicine in the branch of Psychiatry to the University of the Witwatersrand, Johannesburg. It has not been previously submitted for any degree or examination at this or any other University.

This 1st day of February, 2021

DEDICATION

This work is dedicated to my husband, parents, family and friends. Without your encouragement and support this would not have been possible.

Thank you to the inspiring minds who guided me through this process; and to the participants in this study, for the privilege of learning from you.

PRESENTATION ARISING FROM THIS STUDY

1. Oral presentation

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   Wednesday, 21st June 2017 – Sunnyside Park Hotel, Johannesburg.

ABSTRACT

BACKGROUND: Each year millions of children are exposed to adverse experiences (including neglect and abuse). There is evidence that early events impact on lifelong behavioural, biological, emotional and social wellbeing; and childhood maltreatment has been shown to be a major cause of psychiatric morbidity. There are also links between childhood maltreatment and criminal behaviour.

AIMS: To describe the demographic and clinical characteristics of a sample of State patients admitted to Sterkfontein Hospital, and to identify a history of childhood trauma in this group.

OBJECTIVES: Describe the demographic, diagnostic and criminal charge profiles in a group of State patients admitted to Sterkfontein Hospital; assess the history of childhood trauma within this population; describe the different types of childhood trauma experienced; and to assess whether an association exists between the childhood trauma and psychiatric diagnosis and criminal charge.

METHODS: A cross-sectional survey was conducted from January 2016 to June 2016. It included all inpatient State patients over the age of 18 years who were able to provide informed consent (sample size 130). An interview was conducted using the Adverse Childhood Experiences (ACE) questionnaire which was used to calculate an ACE score and data was collected from their clinical files.

RESULTS: The most frequent adverse childhood experience was household dysfunction and the least frequent was sexual abuse. The most common diagnosis was schizophrenia.

The most common criminal charge was assault with intent to do grievous bodily harm. There was neither a significant association between the psychiatric diagnosis and the ACE score, nor between the criminal charge and the ACE score.

CONCLUSIONS: Much of the available literature supports the hypothesis that childhood maltreatment is associated with the development of psychiatric disorders and criminal behaviour. This study did not find evidence of such links in this population, but this outcome may be related to the small sample size rather than a true lack of associations.

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1.0 INTRODUCTION

1.1 Background

What exactly constitutes child maltreatment is a topic of debate because of issues such as cultural differences in what is considered to be abuse and the difficulties in distinguishing between sub-optimal parenting and maltreatment. The majority of definitions specify that emotional, physical and sexual abuse and emotional and physical neglect constitute maltreatment.[1]

In addition to abuse and neglect there are other forms of early life adversity that are of significance, such as living in an environment of domestic violence and poverty.[2] A strong relationship has been shown between the different types of adverse experiences, which indicates that there is an accumulation of risk of experiencing maltreatment.[3] A retrospective analysis of multi-type abuse in childhood that was conducted by Sesar *et al* revealed that 74% of their sample of university students had experienced several different types of abuse and there were significant correlations between each form of abuse.[4]

A variety of risk factors, including female sex, pubertal age and presence of a disability, play a role in the development of child abuse and neglect.[5] Family system risk factors include inadequate supervision by parents, an absent father figure or presence of a stepfather, conflict in the parental marriage, single parent households, parental mental illness and substance use, and parents who themselves had been maltreated as children.[3,6,7] A rate of abuse and neglect of 46% was found in families in which the parents were affected by severe mental illness (schizophrenia or bipolar disorder), as compared to 30% in the general population.[8] On a wider scale, societal risk factors for abuse and maltreatment include living in a dangerous community, poverty, patriarchal values, and a

poorly functioning police service and criminal justice system. Maltreatment occurs in any socioeconomic group, but more severe and chronic cases have been identified in lower socioeconomic groups.[7]

Each year millions (some estimates indicate a figure as high as one billion) of children worldwide are either victims of, or witnesses to, emotional, physical, and sexual abuse. The numbers are higher in low to middle income countries and are highest in Africa.[9] Despite violence against children in South Africa reportedly being treated as a matter of great importance by the government, it is difficult to obtain reliable statistics regarding child maltreatment due to inadequate nationwide monitoring systems.[1] There are also numerous difficulties with official police statistics and, therefore, the prevalence of child abuse in South Africa has been to a large extent unknown. Official statistical reports that are available are likely to be underestimates as many cases of child maltreatment remain unreported.[7]

Scientific interest is increasing around the long-term effects of childhood maltreatment on physical and mental health as well as its effects on brain development and the role played by epigenetic factors.[1,10,11] Early childhood development is an important time when the foundations of emotional and mental health are established.[12] Research has indicated that abuse escalates once the child enters adolescence, which is a vital time for healthy neural, emotional, and social development.[9] Early events impact on lifelong behavioural, biological, emotional and social wellbeing; and childhood maltreatment has been shown to be a major cause of psychiatric morbidity.[2,12,13]

Children's immediate reaction to victimisation and maltreatment is a combination of helplessness, fear, anger, and high arousal. As victimisation generally is recurrent, over

time the child may experience persistently high levels of arousal that disrupt his or her efforts in age-appropriate academic and social pursuits.[14] Abuse negatively impacts on development, undermining the capacity of the individual to thrive at school and at work and to establish healthy relationships.[7]

Children who have been neglected are more likely to be aggressive, anxious, and depressed than those who have not been maltreated in any way and are more likely to experience delays in their cognitive and emotional development. As adults they are more likely to misuse substances, have mental illness, depend on social services, and to be violent.[7] Children who have been sexually abused have been demonstrated to later become the perpetrators of emotional and physical abuse at higher rates than their non-abused counterparts.[6] Exposure to violent behaviour during childhood has been recognised to significantly increase the risk of the individual coming into contact with the criminal justice system at a later stage.[7]

Considerable research is required to establish the pathways linking childhood experiences and adult behaviour and to further explore the effects of maltreatment. There is a clear need to establish interventions for children who are at risk by reframing their ideas about the acceptability of the use of violence and to provide them with alternative ways to handle conflict, anger and aggression. Failure to address this potentially enduring dysfunction at a critical time of childhood development can have an impact on psychological wellbeing that extends into adulthood.[6] Children who have been maltreated require support to improve their social and emotional functioning, so as to reduce negative outcomes such as problem behaviours and mental illness. Such interventions may assist with decreasing the incidence of violent crimes in the household and in society overall.[15,16]

When people with mental illness commit a crime the focus is often on their criminal actions, and the underlying mechanisms of their behaviour and mental illness may be overlooked. If the early lives of offenders are not taken into consideration when planning rehabilitation interventions then it is unlikely that the risk of recidivism will be reduced.[17] To effectively provide a comprehensive treatment plan and improve outcomes for patients and offenders with a history of childhood abuse and neglect, more knowledge is needed about the relationship between childhood maltreatment, mental illness and criminal activities.[18-20]

1.2 Aims

To describe the demographic and clinical characteristics of a sample of State patients admitted to Sterkfontein Hospital, and to identify a history of childhood trauma in this group.

1.3 Objectives

i. To provide a description of the demographic, diagnostic and criminal charge profiles in a group of State patients admitted to Sterkfontein Hospital.
ii. To assess the presence of a history of childhood trauma within this population of State patients.
iii. To describe the different types of childhood trauma experienced by this group.
iv. To assess whether an association exists between the history of childhood trauma and the psychiatric diagnosis and criminal charge.

2.0 LITERATURE REVIEW

2.1 The Scope of Adverse Childhood Experiences/ Child Maltreatment

2.1.1 International Prevalence

Studies conducted in different regions of the world have indicated that child maltreatment is a significant global societal problem.[2,4,21,22]

Soares *et al* conducted a prospective study in southern Brazil with the aim of assessing the prevalence of adverse childhood experiences in adolescents within a certain birth cohort.[3] There was follow-up at 11 and 15 years after birth. In this cohort the most commonly experienced adverse event was parental separation (42%). The next most common adverse experience was emotional neglect (19.7%), followed by domestic violence (10.3%). Eighty five percent of the cohort had experienced at least one adverse childhood event during the time period of the study.

A sample of university students in Bosnia and Herzegovina reported on their experience of adverse childhood events. Thirty percent reported that they had experienced emotional abuse. Twenty four percent had experienced physical abuse and 39% had been sexually abused before the age of 14. Thirty nine percent had witnessed family violence.[4]

A classroom survey was conducted across all lower secondary schools in Oslo, Norway during 2000 and 2001.[21] A self-administered questionnaire was used to assess a history of adverse experiences among the 7329 participants. Thirty two percent reported that their family had financial difficulties, 31% reported parental separation and 22% had been exposed to violence (29% of boys and 16% of girls). A total of 4% (2% of boys and 6% of girls) reported sexual abuse.

Stoltenborgh *et al* conducted a meta-analysis in order to assess prevalence figures of childhood sexual abuse.[22] They included 217 publications of studies from 1980 to 2008. These studies were conducted across Africa, Asia, Australia and the United States of America (USA). The authors found that 18% of girls and 7.6% of boys had a history of sexual abuse. For male children the highest prevalence of sexual abuse was seen in Africa (19.3%).

Data from the Child Protective Services in the USA were collected during 2014 and published in 2016.[23] The data revealed that 0.9% of 640 000 children (5760) were victims of abuse or neglect. Approximately 1580 children died because of abuse or neglect. Seventy five percent of the cases involved child neglect, 17% physical abuse, 8.3% sexual abuse and 6.0% emotional abuse.

2.1.2 South African Prevalence

Burton *et al* conducted the Optimus Study in 2015 assessing the lifetime prevalence of child maltreatment and exposure to violence in a group of 15-17 year old South African adolescents.[7] The sample included children from all provinces in South Africa. This study has provided the first representative data on childhood maltreatment (neglect and abuse) and exposure to violence in South Africa. The survey was conducted through both interviews and self-completed questionnaires.

Twenty percent of the participants (both boys and girls) experienced some form of sexual abuse in their lifetimes, which is noted to be higher than the global average.[7] This is a similar percentage as found in the Stoltenburgh *et al* multi-continent meta-analysis.[22] However, there are some problems with comparing South African statistics to statistics

from other countries, such as different definitions of the offences and different ways of collecting and recording data.

One third of the Optimus Study sample experienced physical abuse. Sixteen percent experienced emotional abuse (females reported higher rates), 20% suffered physical and emotional neglect, and 23.1% were exposed to violence committed by an adult against another child or adult in the household.[7]

The Childline South Africa official report for the period 2014 to 2015 revealed that 15% of all phone calls they received during that year were made to report child abuse.[24] Thirteen percent of calls were about child neglect and 18% about family relationship problems.

2.2 Childhood Trauma and Mental Illness

Most studies have focused on the effects of sexual abuse and have not explored the impact of other kinds of abuse or neglect on lifetime mental health outcomes.[13]

The impact of abuse on an individual is influenced by a variety of biological, environmental and psychological factors with a complex interaction between demographic factors and characteristics of the trauma itself.[6,25] Current evidence suggests that the phenotypic expression of psychopathology is greatly influenced by the experience of maltreatment, that some neurobiological abnormalities may be limited to patients with a history of childhood maltreatment, and that the psychopathological effects of maltreatment may not appear immediately around the time of exposure but may manifest more subtly throughout development.[8]

Central nervous system (CNS) plasticity results in the brain being markedly influenced by early experiences and there are periods of development where these events exert greater effects. Therefore, a child who does not receive adequate positive stimulation may have compromised brain function in specific areas, and children who are repeatedly exposed to negative events may experience overstimulation of some regions of the brain leading to abnormal development.[14,26] The type, duration and severity of maltreatment all affect development differently. It is unclear why not all children are equally at risk of developing psychopathology after having similar adverse experiences, and the pathways connecting childhood maltreatment and negative outcomes are complex and largely unexplained.[2,6]

There are three categories of factors that mediate and moderate the effect of maltreatment on children, with important interactions between these variables.[14] The first category is related to the characteristics of the child such as their understanding of conflict, perception of threat, beliefs in their own ability to cope (in contrast to the use of avoidant coping mechanisms), and self-attributions of blame. The second group of factors is related to the frequency, severity, and chronicity of the abuse. The third group of factors involves the quality of family relationships and the extent of dysfunction in the home environment.[14] The family environment plays a critical role in the child's ability to understand other individuals' emotions. Abused and neglected children often have abnormal patterns of recognising facial expressions and difficulty with understanding the underlying emotions, which ultimately results in an impaired ability to form normal relationships.[27] They also often have an inability to regulate their own emotions.[28]

2.2.1 Possible Mechanisms for the Association between Traumatic Events and Mental Illness

Childhood trauma may lead to increased sensitivity to life stressors with a cumulative effect leading to the development of psychosis in those who are genetically predisposed.[29] Both genetic vulnerability and the exposure to maltreatment are risk factors for serious mental illness.[8]

The hypothalamic-pituitary-adrenal (HPA) axis system has been identified as a potential contributor to the onset of both psychotic and mood disorders.[28-33] HPA over-reactivity with a decreased negative feedback mechanism affects brain structures at critical moments of development. This can diminish hippocampal neurogenesis,[8,31] which in turn would provoke the expression of the cognitive dysfunctions observed in patients with psychotic disorders.[8] A hormone that has been implicated in the regulation of the HPA axis is oxytocin, the levels of which are directly correlated to the level of maternal care experienced by the child. Those who have experienced childhood maltreatment have decreased levels of oxytocin and this leads to an over-activity of the HPA axis in reaction to stress.[31]

A link between dopamine dysregulation (and subsequent psychosis) and environmental stress has been identified,[29] with an increased dopamine response to stress;[31,32] and the experience of childhood abuse has been noted to correlate with the positive symptoms of psychosis.[19,31]

A polymorphism of the brain-derived neurotropic factor (BDNF) gene has been linked to both psychosis and mood symptoms in those who experienced childhood adversity. BDNF stimulates growth and differentiation of developing neurons. Early stress can influence the

BDNF expression which may produce long-term effects on neuronal growth and plasticity. It is via this mechanism that it is thought that the BDNF polymorphism moderates the relationship between childhood adversity and psychosis.[31,34] Additionally, BDNF up-regulates the release of oxytocin, so changes in BDNF will affect the regulating effect of oxytocin over the HPA axis, thereby mediating the effects of childhood maltreatment.[31]

A leading cause of mental illness is early life trauma occurring in genetically vulnerable people.[2,20] People who have a history of childhood trauma have poorer physical and mental health, with poorer treatment adherence and worse social functioning.[19] The use of mental health care services is four times higher in those who have experienced childhood sexual abuse as compared to those with no history of childhood sexual abuse. Abuse during childhood is associated with a significantly increased incidence of subsequent anxiety, personality, substance use and mood disorders.[6,33,35]

In the Adverse Childhood Experiences (ACE) study data was used to assess the long-term effects of childhood abuse and exposure to household dysfunction on disease risk factors, disease incidence, mental health, quality of life and mortality.[36] The findings showed that with an increase in the number of adverse exposures the prevalence of smoking, obesity (and the complications of these), depression and suicide attempts increase. The risk appeared higher when there was exposure to four categories of adverse experiences. The majority of participants in the ACE study who had experienced one type of adversity in childhood had been exposed to at least one additional type of adverse experience. There was also an increase in prevalence of alcohol use disorders, substance use disorders and sexual risk-taking behaviours as the number of exposures increased. The ACE score has been shown to be a strong predictor of alcohol and other substance use disorders, depression, suicidal behaviour and use of psychotropic medication (antidepressants,

anxiolytics, antipsychotics and mood stabilisers). The findings suggest that the impact of these adverse childhood experiences on adult health status is strong and cumulative, and that an exposure to a combination of adverse experiences is associated with worse outcomes.[14]

Other studies using the ACE questionnaire have yielded similar results. Austin identified that ACE exposure in those with physical and mental disabilities was higher than in those without disability (36.5% versus 19.6%).[37] Others have established that the association between ACE and poor health is present from adolescence, with increased use of medical care and that there is a cumulative risk relationship.[38,39] Studies assessing the particular effects of the different types of abuse have produced mixed results.[2,6,11]

2.2.2 Psychotic Disorders

Multiple studies have suggested a robust relationship between childhood abuse and the positive symptoms of psychosis.[19,30-32,34,40,41] Alemany *et al* assessed psychotic-like experiences and childhood adverse event exposure in members of the general population.[34] They found that childhood adversity (not including neglect) had a strong positive effect on the positive symptoms of psychosis, and a lesser (but still significant) effect on the negative symptoms of psychosis. Therefore, adverse experiences during childhood may create a psychological or biological vulnerability to developing psychotic symptoms.[34] In a review by Read *et al* an association with hallucinations and delusions was demonstrated, and they found that a cumulative dose of trauma increases the incidence of hallucinations.[33] Bebbington found that people with psychotic disorders have a history of much higher levels of adverse childhood events when compared to people with no psychiatric disorders.[40] In 2011 Bebbington expanded on this finding and described

further evidence that the association between childhood sexual abuse and psychotic disorders is particularly strong, and possibly has a causal relationship.[41]

Epidemiological studies have corroborated that a lifetime experience of psychosocial stress and adverse experiences is related to the onset of psychotic symptoms, with cumulative exposure to trauma and psychosocial stress increasing the risk.[29,30,32] This relationship is particularly seen in those who are already at a high genetic risk of developing schizophrenia. This has been demonstrated in adoption studies of children who are genetically at risk of developing schizophrenia.[29,31] If they were adopted into dysfunctional families their rates of schizophrenia are higher than usual rates of schizophrenia, while those children who were adopted into stable families had rates of schizophrenia similar to the general population. Research has indicated that it is the experience of the trauma being an uncontrollable event that is particularly linked to the emergence of psychotic symptoms.[29]

Cognitive dysfunction is a central feature of schizophrenia and includes deficits in episodic memory,[42] language and attention[43] and cognitive flexibility.[44] There is recent evidence to suggest that the cognitive decline begins in childhood, so that at the time of the prodromal phase of schizophrenia cognitive deterioration has already occurred.[45] The cognitive impairment has a genetic basis, and environmental influences impact on the developmental trajectory. Abuse and neglect have a negative influence on cognitive functioning in samples of healthy adults and children as well as in patients with psychosis. It has been suggested that the psychosis is the end-point of a decline in cognitive functioning beginning in childhood. This is indicative of a mediating developmental mechanism for the association between childhood maltreatment and later psychotic symptoms.[8]

There is a large variation in figures but according to Sungun *et al* some studies have found that up to 65% of schizophrenic patients have a history of sexual or physical abuse that occurred during their childhood.[19] A review by Mauritz *et al* found that in patients with severe mental illness 47% reported childhood physical abuse and 37% reported sexual abuse.[46] These figures were statistically different from the rates of physical and sexual abuse seen in the general population. Rajkumar assessed the rates of abuse in schizophrenic patients and found that 56.5% had experienced childhood emotional abuse, 33.9% physical abuse and 3.2% sexual abuse.[47]

However, there are some studies that show no such relationship. For example, a large prospective study that included 1612 children who had been confirmed by forensic examination to have been sexually abused found that they had no increased risk of developing psychosis.[25] Similarly, a systematic review and meta-analysis conducted by Chen *et al* in 2010 included 37 longitudinal observational comparative studies.[20] The combined sample of these studies was 3 162 318 participants. They found no statistically significant association between a history of sexual abuse and a lifetime diagnosis of schizophrenia.

2.2.3 Mood Disorders

Childhood physical abuse has been linked to adult depression.[13,31] The harsh and uncontrollable punishment and parental rejection found within an abusive home environment may cause learned helplessness, anxiety, and depression in the child. Violence exposure can be interpreted by the child to mean not only that the world is unsafe, but also that the child is unworthy of being kept secure. Whether related to violence in the home or in the community, these attitudes potentially contribute to the development of negative self-perceptions and internalising problems. Elevations of

depression and hopelessness in physically abused versus non-maltreated children have been found in psychiatric inpatient samples as well as non-clinical samples of children and adolescents.[14]

In particular, childhood sexual abuse is strongly associated with the development of major depressive disorder.[6,20,30] Chen *et al* conducted a systematic review to assess the association between sexual abuse and lifetime psychiatric illness.[20] This review, that included 37 longitudinal observational studies (of 3 162 318 participants), demonstrated an association between a history of sexual abuse and a lifetime diagnosis of depression, sleep disorders and suicide attempts. A history of rape strengthened the association between abuse and subsequent depression. They reported that there have been studies that have shown that genes involved in the HPA-axis and variants of the corticotropin-releasing hormone (CRH) receptor gene are involved in the development of depression in people with a history of trauma.[20] A functional polymorphism of the serotonin transporter gene has been demonstrated to lead to an increased risk of depression and suicidal behaviour in those with a history of severe childhood adversity.[30]

Less attention has been given to the interaction between childhood adverse experiences and bipolar disorder as compared to major depression, post-traumatic stress disorder (PTSD) or borderline personality disorder.[48] Exposure to abuse and neglect in childhood increases the risk of later bipolar disorder and has also been linked to mood episode relapses.[8,31,48] Garno *et al* found that in half of their sample of bipolar patients there was a history of severe abuse and that in one third of them there was a history of multiple forms of abuse.[48] The mechanisms underlying this association are not well understood.[8] It is postulated that trauma influences mood instability. Childhood trauma may influence the expression of symptoms in bipolar disorder, as well as the prodromal features of the

disorder. Bipolar disorder is a stress-sensitive condition, with the first mood episode often being triggered by psychosocial stressors.[49] Childhood trauma also appears to impact the course of the illness, being associated with earlier illness onset, an increased number of comorbidities, suicidal behaviour and worse clinical outcomes.[48,49] In particular, severe emotional abuse in childhood has been significantly linked to comorbid substance misuse and rapid cycling of symptoms, and severe sexual abuse has been shown to be significantly associated with increased rates of suicide attempts among bipolar patients.[48]

2.2.4 Cognitive Impairment

Several studies have produced evidence of a link between maltreatment and poor cognitive performance.[6,11,14,50,51] Abuse and exposure to violence have been linked to delayed cognitive development and poor academic functioning, which suggests impairment along several developmental lines.[6,12] There are possible neurocognitive consequences of exposure to trauma involving hippocampal damage and left hemisphere abnormalities. It has also been suggested that increased noradrenaline levels are likely to cause hippocampal impairment.[8]

Teicher *et al* compared physically and sexually abused child and adolescent psychiatric patients to non-abused patients,[11] and higher rates of abnormalities of the left frontotemporal cerebral regions and deficits on neuropsychological testing were found. There appears to be a particular deficit in verbal ability and comprehension in abused children when compared to non-abused children.[11,50,51] Possible left hippocampal and left hemisphere changes after exposure to violence and abuse may affect memory function and verbal skills.[8]

Being exposed to violence in the community has been connected to poorer school performance with lower school achievement.[52] Neglect has been most consistently linked to poor academic outcomes as compared to physical and sexual abuse,[8] and exposure to community violence and abuse has been associated with lower overall achievement on standardised testing.[53]

2.2.5 Substance Use Disorders

A hypothesis to explain the link between retrospective reports of childhood abuse and substance use disorders is self-medication as a way to manage the psychological consequences of abuse.[54,55] Abused children may tend to be more self-destructive than other children, and it has been found that sexually abused children are particularly more so.[8] It is not clear whether childhood maltreatment actually predicts future substance use, but there is evidence that it does increase the risk of substance use in adulthood.[56] Not all evidence is consistent with this. For example, Bebbington *et al* found no association between childhood sexual abuse and subsequent heavy cannabis use (which they defined as use on more than 100 occasions).[41] There is mixed evidence as to whether the risk is different between males and females.[56]

2.2.6 Other Psychiatric Conditions

A history of childhood trauma has been linked to several other psychiatric conditions such as PTSD, personality disorders, disruptive behaviour disorders in childhood and adolescence, and suicidal behaviour.[6,8,13,20]

There is a dose-response relationship with repeated childhood physical abuse in both anxiety and PTSD.[13] PTSD is particularly significantly associated with a history of childhood sexual abuse.[6] Evidence suggests that serotonin transporter gene

polymorphisms and serotonin pathways influence the development of PTSD in victims of trauma.[20] A greater severity of abuse, a more chronic path and an earlier age at onset of abuse are all factors that seem to increase the risk of developing PTSD.[8]

Research has indicated that childhood abuse is a risk factor for the development of personality disorders.[25,27,35,55,57-59] There is evidence that emotional abuse plays a larger role in the development of personality disorders than other forms of abuse.[60,61] There is a particular increase in risk for borderline, narcissistic, paranoid, schizoid and schizotypal personality disorders. There is not much evidence with regards to whether specific types of abuse are particularly detrimental or linked with characteristics of specific personality disorders.[12,60-62] There are some indications that emotional abuse is most strongly related to schizotypal personality disorder, possibly through the development of odd perceptions and beliefs that arise as a way to cope with the abuse.[55]

The witnessing of violent behaviour between parents has been associated with the development of aggression and disruptive behavioural disorders in children (oppositional defiant disorder and conduct disorder). A link between this and violent behaviour and substance use as an adult has been demonstrated.[16] Physical abuse has been linked more consistently with aggression than either neglect or emotional abuse. The link with sexual abuse is inconsistent.[8]

The serotonin transporter gene and its variants have been demonstrated to contribute to the risk of suicidal behaviour in people with a history of severe childhood adversity.[30] A dose-response relationship has been demonstrated between repeated childhood physical abuse and non-fatal suicidal behaviour and deliberate self-harming behaviour.[13]

2.3 Childhood Trauma and Criminal Behaviour

There is no one factor that can be held accountable for the development of criminal behaviour. There are studies that demonstrate that childhood victimisation is a risk factor for future crime, victimisation of others and violent behaviour (described as the “cycle of violence”) but the mechanism underlying this relationship is unclear.[10,54] Prospective studies that have compared abused and non-abused children found that those who were abused were at a two-times greater risk of being arrested for violent crime, and also for chronic criminality.[10] There has been a fair consistency in studies indicating that there is a risk of serious behavioural problems linked to childhood exposure to violence.[8,10,12-15] Victims of physical abuse tend to display more violent offending whereas victims of sexual abuse tend to perpetrate sexual crimes. Childhood maltreatment predicts adult crime in both males and females, but findings have differed with regards to whether or not males are more affected than females.[18]

One mechanism that may explain the link between abuse and criminal behaviour is through social learning. Physical aggression between family members teaches children that aggression is a normal and acceptable way in which to resolve conflict.[10,15,63] Aggressive children are likely to continue being aggressive into adulthood.[15]

In South African studies it has been found that violence is normative and generally accepted by communities.[64,65] Helman and Ratele describe how gender inequality in South Africa is perpetuated by social constructs of masculine dominance and acquiescent femininity, which is a risk factor for gender based violence.[66] Domestic violence is common and the children in these households witness it, which has a negative impact on the child’s emotional and social development. Boys who experience frequent episodes of parental conflict in childhood are at higher risk of being violent in adolescence and adulthood. In a

study of 600 Cape Town men it was found that one quarter had witnessed the abuse of their mother.[15] This was associated with several types of dysfunctional behaviour developing as an adult, including intimate partner violence, violence at work and in the community, arrests for violent and antisocial behaviour, and arrests for possession of an illegal firearm.

A study was conducted on high school students in the USA using the ACE questionnaire in order to assess a relationship between self-reported adverse experiences and aggressive behaviour during adolescence.[17] With each adverse experience reported there was an increased risk of violence in the male participants. A history of sexual abuse as a child increased the risk of engaging in sexual violence against a romantic partner. The results of this study indicated a strong relationship between adverse childhood experiences and pathology in later life. Meta-analytic research conducted by Jespersen *et al* demonstrated that male sexual offenders are three times more likely to have been sexually abused than non-sexual offenders.[67] Being physically or sexually abused or growing up in an environment of domestic violence was found to be significantly related to later intimate-partner violence.

Another possible mechanism linking childhood trauma and criminality is through substance use. Abused and neglected children may develop maladaptive coping mechanisms and self-medicate with substances. The link between alcohol use and violent offending is well established,[10] and this relationship is also seen in studies on adolescents, delinquent behaviour and sexual aggression.[54]

Another theory is that the experience of adverse events in childhood hinders the ability to form secure attachments to people, which may later manifest as violence towards others.

There has been some work that links dysregulation of the HPA axis with the development of pathological attachment and this may provide an explanation for the link between abuse and criminal behaviour.[17] Conversely, a close relationship with one parent reduces the risk of the victim later becoming a perpetrator of abuse.[14]

Criminal recidivism has been demonstrated to be more strongly predicted by childhood neglect rather than either physical or sexual abuse.[18] However, having been exposed to a violent environment over a long period of time may result in chronic violent offending.[16] In a study conducted by van der Put *et al* a weak association was found between physical abuse and neglect and general recidivism in a population of juvenile offenders.[18] In males, being a victim of physical abuse contributed to violent criminal recidivism (an association which was not seen in females).

The available body of research consistently indicates that there may be an increased risk for later negative outcomes (in terms of behaviour) in children who are exposed to adverse experiences.[10,12-15,17,18,63-67] However, from these studies it is also apparent that, although there are significant associations, the majority of such children do not go on to commit criminal offences.[14,54,68,69] For example, only 1 in 6 of maltreated children are estimated to become offenders and only 1 in 8 boys who have been sexually abused go on to become sexual offenders.[70,71] This has been attributed to the possibility of there being multiple pathways between childhood adversity and criminal behaviour, and an influence of alcohol use problems, developmental stage at which the child was exposed to adversity and the other family and social characteristics of the child.[10,14] As there are multiple factors at play it is not inevitable that childhood adversity inevitably leads to negative outcomes or victimisation of others.[68,69,14]

2.4 Mental Illness and Serious Crime

There have been several specific psychiatric conditions that have been linked to an increase in criminal behaviour.[72]

2.4.1 Violent Crime

Stereotypes have been perpetuated in the popular media about violent crimes being committed by those with mental illness. In general, researchers concur that mental illness increases the risk for both victimisation and the carrying out of violent acts.[73] However, there have been conflicting reports regarding the link between severe mental illness and the commission of violent crime. The differences in these results may be accounted for partly by the use of differing methodologies in data collection. For example, some studies may report on the prevalence of mental illness among convicted violent offenders, others may assess violence and crime among psychiatric clinical groups and yet others may assess the prevalence of violent crime among those with mental illness living in the general population.[73]

In order to synthesise some of this conflicting evidence Joyal *et al* conducted a review of the literature regarding this topic.[74] Their findings are strongly in support of an increased risk of violent behaviour in people with severe mental illness, such as schizophrenia. The rates of serious violence are up to 8.5% among schizophrenic patients and the violence risk may be higher in bipolar disorder. They suggest that variables such as substance use (including alcohol and illicit substances) and compliance to medication may affect outcomes.[73,74]

A longitudinal 26-year prospective study on a birth cohort of 12 058 individuals was conducted in Northern Finland.[72] The results indicated odds ratios for any criminal offence

in schizophrenia being 3.1 and for mood disorders with psychotic disorders being 6.3. The odds ratios for violent offences were indicated as being 7.0 for schizophrenia and 8.8 for mood disorders with psychotic features. Thus, when comparing the odds ratios for any offence and for violent offences, an increased risk of violent behaviour in schizophrenia and mood disorders with psychotic features was demonstrated. The authors identified that seven percent of violent offenders were diagnosed with psychosis. It was noted that there was a particular increase in the risk of violent offences in substance users. This study demonstrated that the rate of violence is highest among individuals with substance use disorders rather than schizophrenia or other psychotic disorders. Rates of substance use disorders among violent offenders (self-reported) range from 20 to 42%.[73]

In contrast to these conclusions are the findings of the McArthur study.[75] This was a prospective study that included more than 1000 psychiatric patients and 500 members of the general population who were followed up for a duration of one year. The findings of the McArthur study indicate that there is no increased risk of violence in psychiatric patients as compared to the general population. This study also highlighted the exception that co-morbid substance use did increase risk.

There is not much evidence linking specific risk factors (other than substance use as described above) with the development of violent behaviour in people with severe mental illness. The risk of violence is influenced not only by the symptoms of the mental illness, but also by the environment in which the individual resides. For example, living in high-crime areas which are dangerous or threatening has been linked to violent behaviour.[76] While it appears that most people with severe mental illness are not more dangerous than the general population, a study conducted by Swartz *et al* found that a greater risk of violence is associated with co-morbid substance use, non-adherence to medication and

follow up, and poor insight into mental illness.[76] These risk factors are corroborated in a review by Lamb.[77] It appears that a greater proportion of mentally ill people are arrested compared with the general population. This could, in part, be explained by the stigma surrounding mental illness that may result in decreased tolerance of deviant behaviour in those people who are mentally ill.[77] Research has estimated that the risk of an individual with psychosis committing a violent offence compared with a general population group of a similar age is between two and six times for men and two and eight times for women. The risk of aggressive behaviour or assaults peaks at the time shortly before and after hospitalisation when psychotic symptoms are most severe.[74]

In addition, it has been suggested that emotional dysregulation acts as a mediator for violent behaviour and may be a primary mechanism by which the risk of violence is increased in psychiatric patients.[73] A few studies have also looked at the presence of dissociative symptoms as having predictive value for violent behaviour. It appears that the presence of chronic and enduring dissociative symptoms is associated with general aggressive behaviour and this may be linked to the emotional dysregulation present in individuals with dissociative symptoms. However, potentially significant comorbidities such as mood or substance related disorders may play an important contributory role in the development of violent behaviours within this group of people.[73]

2.4.2 Sexual Offences

Mental disorders that are seen frequently in sexual offenders include mood disorders, intellectual disability, substance use disorders, and personality disorders such as antisocial personality disorder.[78-80] In the Finnish study previously referred to,[72] it was found that when compared with controls schizophrenic patients were not more likely to be convicted of sexual crimes. Intellectual disability has been linked to an increased risk of sexual

offending.[81] However, those with more severe intellectual disability (with lower levels of functioning) are less likely to commit sexual offences than the less severely impaired.[82]

In a review of the current literature regarding the role of dissociative symptoms and violence, Webermann and Brand found that the presence of chronic dissociative symptoms is positively correlated with sexually aggressive behaviour and concluded that dissociative symptoms may be a predictor of interpersonal sexual violence.[73]

In addition to the acute symptoms of mental illness there are secondary/associated symptoms that may contribute to the risk. People suffering from a severe mental illness may experience social isolation, social skill deficits and stigmatisation. Their social difficulties may be exacerbated by problems with housing and unemployment. The general social instability they experience may be compounded by impaired cognitive and emotional function. The presence of these dynamic risk factors indicates that symptoms of mental illness such as psychosis are rarely the primary motivator for the sexual offence. However, the diagnosis of a mental illness contributes to risk.[83]

2.4.3 Other Crimes

In the Finnish longitudinal 26-year prospective study odds ratios for any criminal offence were 3.1 for schizophrenia and 6.3 for mood disorders with psychotic features.[72] There was a low risk for offences other than violent crimes but the risk was increased when there was co-morbid alcohol use or other substance use disorders. This is consistent with the findings of Mullen *et al* in their study on offending in patients with schizophrenia.[84] Organic mental disorders had the highest risk for traffic offences and offences against property. Females were less likely than males to commit any type of crime. Lower

socioeconomic status in psychiatric patients was associated with a slightly higher risk of criminal behaviour.[72]

3.0 METHODS

3.1 Study Design and Site

This was a cross-sectional survey conducted at Sterkfontein Psychiatric Hospital in Krugersdorp, Gauteng. One of the services provided by Sterkfontein Hospital is the admission and treatment of patients who had been charged with serious criminal offences and during forensic observation were found to have been not fit and/or not responsible for the crime due to the nature of their mental illness. These “State patients” are subsequently admitted under section 42 of the Mental Health Care Act No. 17 of 2002.[85] Data was collected from 4 January 2016 to 30 June 2016.

3.2 Study Population

Participants were recruited from the inpatient male and female forensic State patient wards at Sterkfontein Hospital. The treating multi-disciplinary teams identified those patients in their wards with the capacity to give informed consent to participate in this study. The researcher approached all potential participants and appraised their capacity to provide informed consent to participate in the study. Thereafter, the researcher obtained written informed consent from each participant who was deemed able to provide consent. All consenting inpatients older than the age of 18 years were included in the study.

3.3 Sample Size

The required sample size was estimated based on the key research question, which was the association between the overall ACE score and psychiatric diagnosis and with the criminal charge. This required a one-way Analysis of Variance (ANOVA). For the determination of small, medium and large effect sizes with 80% power at the 5%

significance level, sample sizes of 1290, 216 and 90 were required. Sample size calculations were carried out in G*Power.[86]

One hundred and thirty State patients were interviewed during the course of the study. This sample included 125 male participants and 5 female participants. Actual sample size was limited by the number of patients present in the hospital during the data collection period, the number of patients who were capable of consenting, and additionally by patients declining to participate in the study.

3.4 Material

After consent was obtained, confidential data was collected regarding a history of traumatic childhood experiences using the Adverse Childhood Experiences (ACE) questionnaire during a face-to-face interview (Appendix A). A variety of measurement tools have been developed for use in adults to retrospectively assess their exposure to childhood abuse and neglect.[11] There is a lack of instruments that have been developed specifically for use in the South African context.[1]

The ACE study group developed the ACE questionnaire for use as a retrospective measurement tool.[36] The ACE questionnaire is freely available from the Centers for Disease Control and Prevention. The ACE Study was conducted in a primary care setting and the objectives were to describe the long-term relationship of childhood experiences to important medical and public health problems. The ACE questionnaire incorporates multiple types of adverse experiences that may occur before the age of 18 years, and takes into consideration the cumulative effects of such exposures. The questionnaire includes three forms of abuse (emotional, physical and sexual), and five forms of household dysfunction (exposure to criminal behaviour, substance use, mental illness,

parental separation and divorce, and violence towards the mother figure). It also includes measures of physical and emotional neglect.[11,36] An ACE score is derived by allocating one point to each category of adverse childhood experiences resulting in a possible score of 0-10.[36]

The ACE questionnaire is likely to be appropriate for use in the South African context because the risk factors that are included and the definition of what comprises child maltreatment are appropriate to South African society. In a critical review of assessment scales used in childhood maltreatment, it was noted that the ACE questionnaire has been used widely, and that test re-test reliabilities and convergent validity have been shown to be good by correlating the ACE questionnaire with previous self-reports of child sexual abuse.[1]

Demographic data and information surrounding psychiatric diagnosis and criminal charges were collected by file record review. Information collected included: age, age at index episode, criminal charge, repeat offences, psychiatric diagnosis, substance use, family history of mental illness, marital status, number of children, highest level of education and employment status at the time of the offence (Appendix B).

3.5 Data Analysis

Descriptive analysis of the data was carried out as follows: categorical variables were summarised by frequency and percentage tabulation, and illustrated by means of bar and pie charts; and continuous variables were summarised by the mean, standard deviation, median and interquartile range, and their distribution illustrated by means of histograms.

The relationship between ACE score and diagnosis or charge was assessed by one-way ANOVA. Where the data did not meet the assumptions of the test, a non-parametric alternative, the Kruskal-Wallis test was used. The strength of the associations was measured by the Cohen's d for the ANOVA and the r-value for the non-parametric test. The following scale of interpretation was used:

1. 0.80 and above: large effect
2. 0.50 to 0.79: moderate effect
3. 0.20 to 0.49: small effect
4. below 0.20: near zero effect

The actual sample size of 130 patients was sufficient for the detection of medium-large effect sizes only. Data analysis was carried out using SAS version 9.4 for Windows. The 5% significance level was used.

3.6 Ethics

Ethical clearance was granted by the University of the Witwatersrand Human Research Ethics Committee (Medical) prior to the commencement of data collection (Appendix C). As inpatients the study population had ready access to psychology services, and when psychological distress was identified during the administration of the questionnaire a referral to the psychology department was arranged by the principal researcher. The treating doctors were also alerted to the psychological distress experienced by the participant. This was arranged in conjunction with the Chief Psychologist at Sterkfontein Hospital.

3.7 Funding

Private funding was used by the principal researcher for transport and photocopy costs that were incurred.

4.0 RESULTS

The study sample consisted of 130 State patients who were inpatients at Sterkfontein Hospital between 4 January 2016 and 30 June 2016.

4.1 Characteristics of the Study Population

The ages of the participants ranged from 20 years to 70 years with a mean age of 38 years (standard deviation 10.1). Patients under the age of 50 years made up 88.5% of the sample, with the most represented age range being from 31 to 35 years, 23.8% of all participants (n=31). One hundred and twenty five (96.2%) participants were males. There were only five female participants. One hundred and fifteen (88.5%) participants were unemployed at the time of the offence, and 15 (11.5%) had formal employment at the time of the offence. The majority of the sample ended their schooling during their secondary school years (n=68, 52.3%) with only 20 (15.4%) having completed grade 12. Only eight (6.2%) went on to tertiary education or training, while six participants (4.6%) reported that they had never attended school. One hundred and nineteen (91.5%) participants were single, six (4.6%) were married and five (3.8%) were divorced. The majority did not have children (n=97, 74.6%). The demographic profiles of the participants are summarised in Table 4.1.

Table 4.1: Characteristics of the study population

n		130	%
Age	Mean ± SD	38 ± 10.1	
	Youngest	20	
	Oldest	70	
Gender	Male	125	96.2
	Female	5	3.8
Marital status	Single	119	91.5
	Married	6	4.6
	Divorced	5	3.8
Children	Yes	33	25.4
	No	97	74.6
Level of education	None	6	4.6
	Primary	28	21.5
	Secondary	68	52.3
	Matric	20	15.4
	Tertiary	8	6.2
Employment	No	115	88.5
	Yes	15	11.5

n = number of subjects, % = percentage, SD = standard deviation

4.2 The ACE Score

4.2.1 The Median Total ACE Score

The median total ACE score was 3.5 (interquartile range: 4). The percentages of the participants with the various ACE scores are reflected in Figure 4.1.

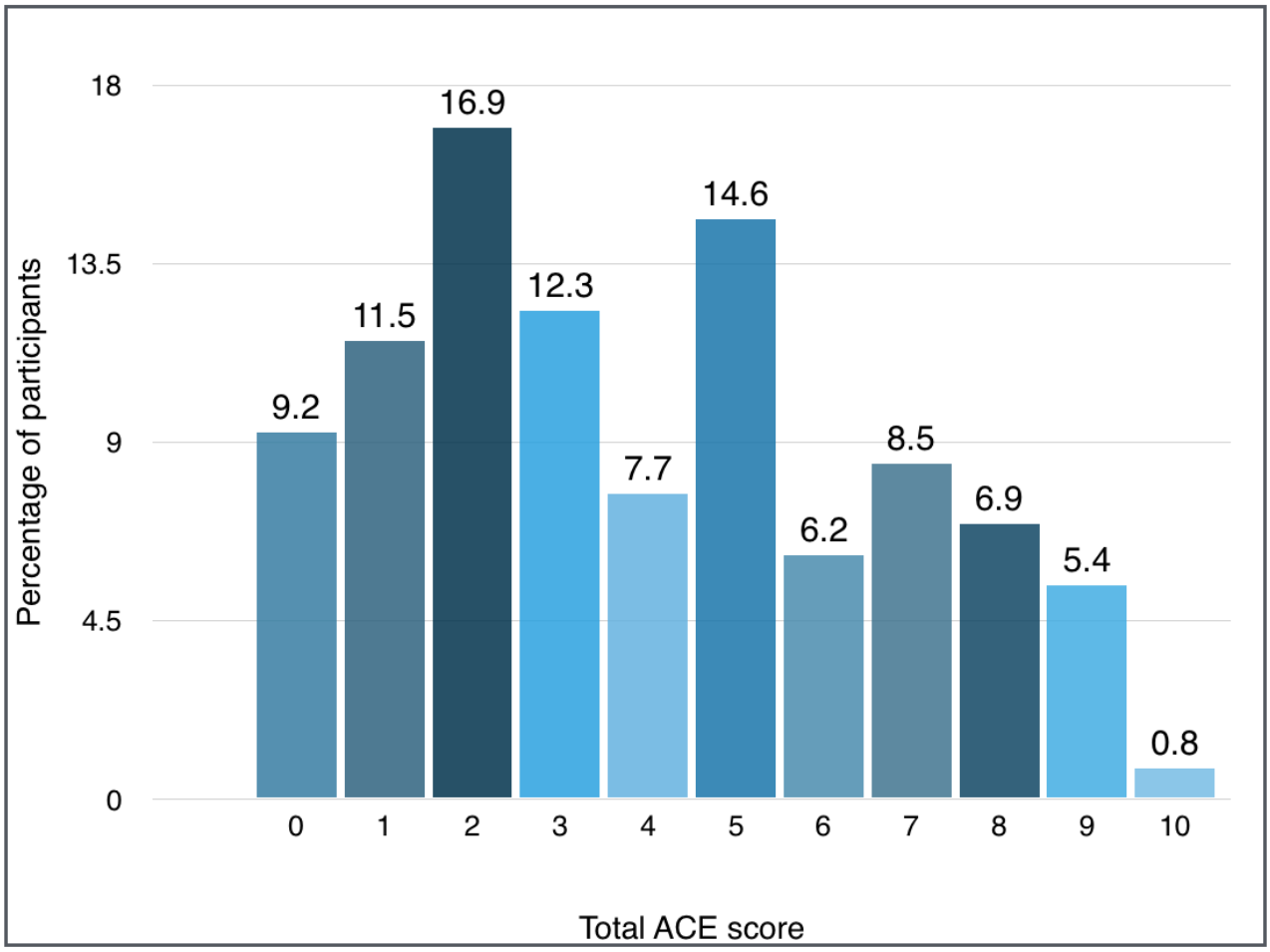

Figure 4.1 Distribution of the total ACE score

The two most frequently experienced ACEs were reflective of household dysfunction (separation/divorce of parents and exposure to substance use in the household). Sexual abuse was the least common ACE.

4.2.2 Measures of Emotional Abuse

Question 1 of the ACE questionnaire addresses emotional abuse. Fifty eight participants (44.6%) reported that they had often experienced emotional abuse in the form of being insulted, sworn at, humiliated or feeling threatened.

4.2.3 Measures of Physical Abuse

Question 2 of the questionnaire is a measure of physical abuse. Fifty one participants (39.2%) had often experienced being slapped, pushed, hit or injured by an adult during their childhood.

4.2.4 Measures of Sexual Abuse

Thirty two participants (24.6%) reported that they had been either touched in a sexually inappropriate manner or raped when they were children (question 3 of the questionnaire).

4.2.5 Measures of Child Neglect

Questions 4 and 5 of the ACE questionnaire assess child neglect (both emotional and physical). Thirty seven (28.5%) participants reported having experienced emotional neglect (question 4) as children and 57 (43.8%) participants were subjected to physical neglect (question 5).

4.2.6 Measures of Household Dysfunction

There are five questions that assess household dysfunction (questions 6 to 10). Seventy four participants (56.9%) had parents who separated or divorced during their childhood years. Forty five participants (34.6%) had witnessed the physical abuse of their mother or mother-figure. Seventy four (56.9%) had grown up in a household where at least one adult was misusing alcohol or illicit drugs. Thirty five (26.9%) had lived with an adult with mental

illness. Forty nine participants (37.7%) had the experience as a child of an adult member of their household being imprisoned.

The percentage of affirmative answers to each of the ACE questions (1-10) is reflected in the figure 4.2.

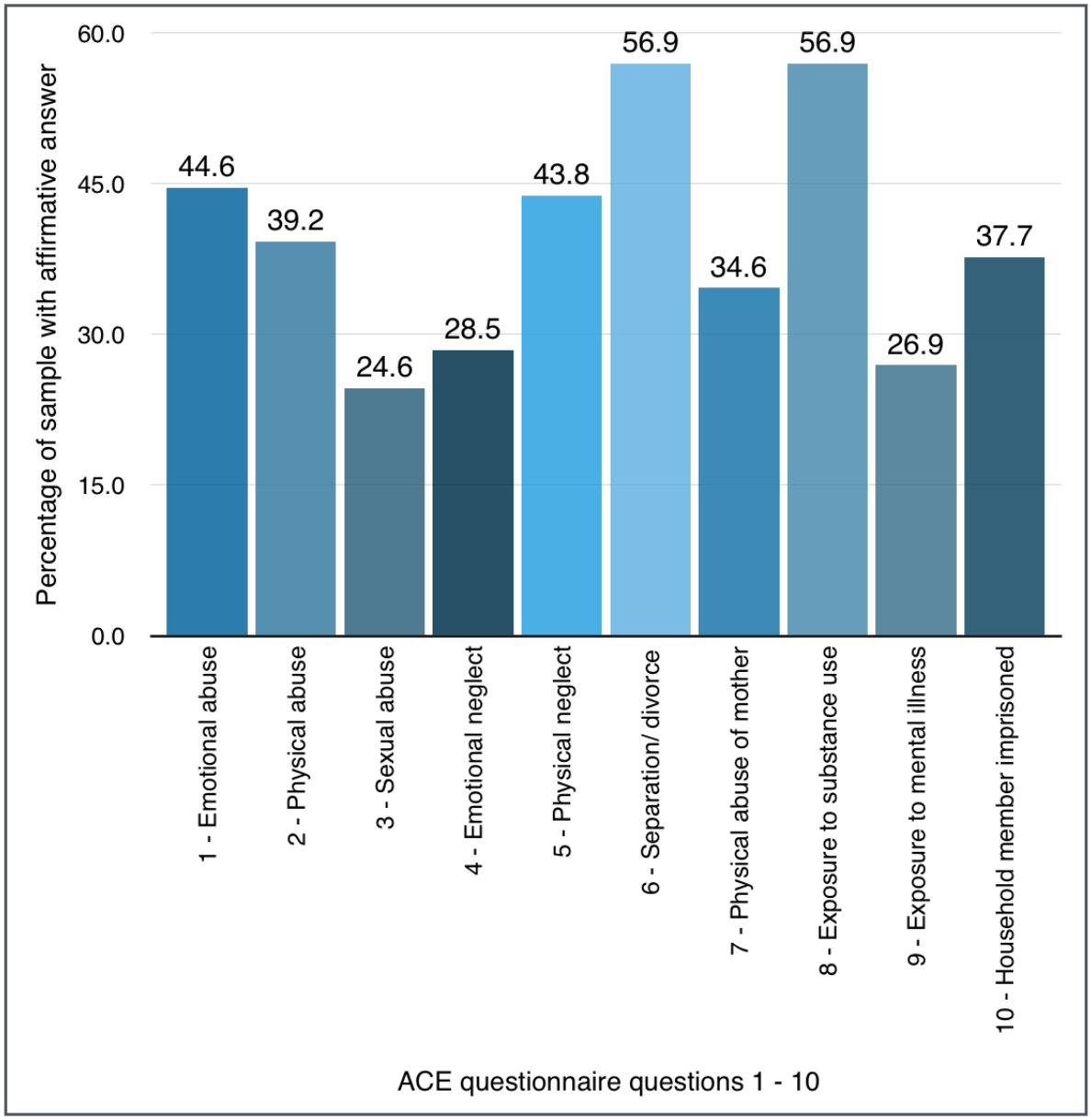

Figure 4.2 Distribution of affirmative answers to each question of the questionnaire

4.3 Diagnosis

The most common diagnosis among the State patients was schizophrenia (n=74, 56.9%). This was followed by bipolar disorder and schizoaffective disorder of the bipolar type with 15 participants each (11.5% each). Eleven participants (8.5%) had a psychiatric disorder due to another medical condition: seven of these patients had a history of a previous significant head injury (5.4%), three patients were diagnosed with epilepsy (2.3%), and one with psychiatric sequelae of Human Immunodeficiency Virus (HIV) (0.8%). Seven participants were diagnosed with substance induced psychiatric conditions (5.4%) and seven with intellectual disability (5.4%). There was one patient with autistic spectrum disorder (0.8%). The distribution of the diagnoses is indicated in Figure 4.3.

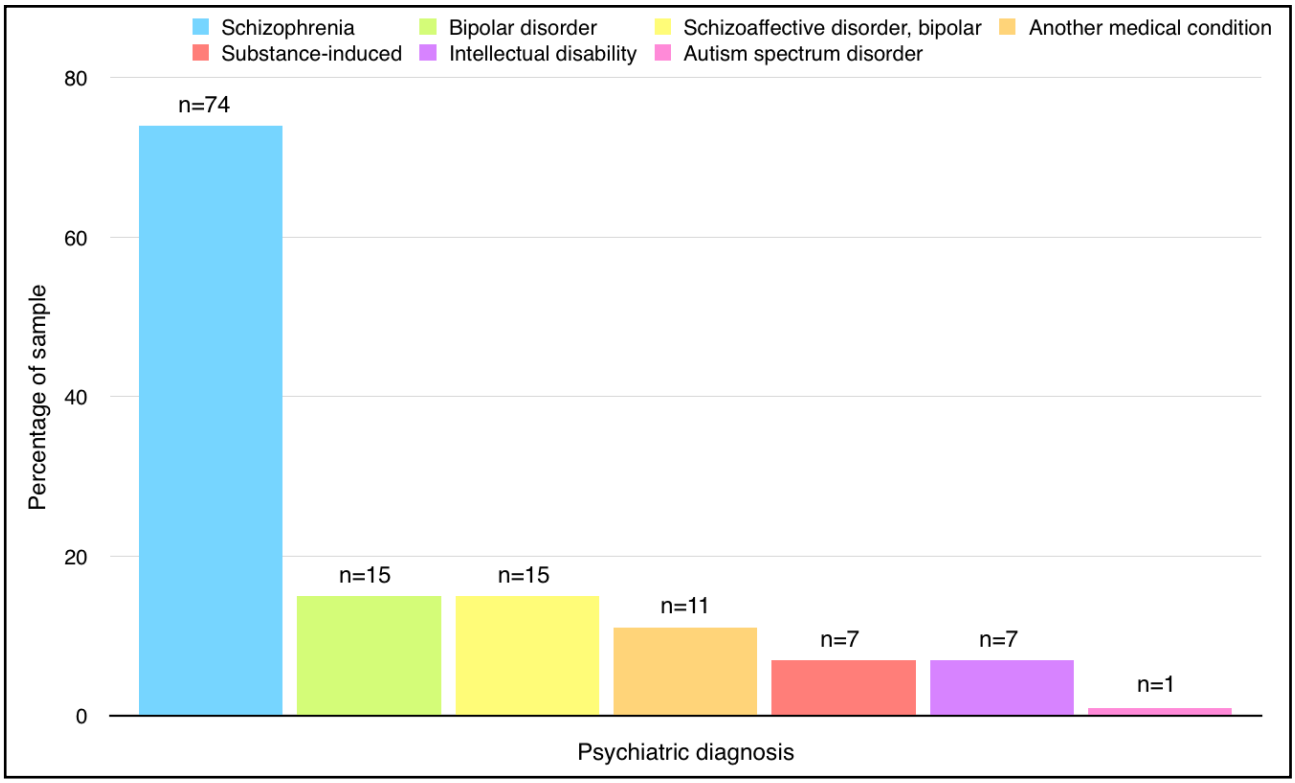

Figure 4.3 Distribution of psychiatric diagnoses

For six of the participants (4.6%) the age of their index presentation with mental illness was unknown; and 80 (61.5%) of participants had their index presentation between the ages of 16 and 25 years. The mean age at index presentation was 21.7 years (standard

deviation 9.2). Seventeen participants (13.1%) were diagnosed with a treatment resistant disorder. One hundred and one (77.7%) participants had a history of substance use.

4.4 Criminal Charge

The most common criminal charge that resulted in the participant being declared a State patient was assault with intent to do grievous bodily harm (GBH) (n=51, 39.2%). Murder and rape both accounted for 12.3% of participants each (n=16). This was followed by attempted murder (n=10, 7.7%), robbery (n=8, 6.2%), sexual assault (n=8, 6.2%), malicious injury to property (MITP) (n=6, 4.6%), and rape of a minor (n=5, 3.8%). The category “other” (n=10) includes arson (n=2, 1.5%), contravention of a protection order (n=2, 1.5%), attempted rape (n=1, 0.8%), attempted robbery (n=1, 0.8%), conspiracy to commit murder (n=1, 0.8%), housebreaking (n=1, 0.8%), possession of a firearm (n=1, 0.8%), and theft (n=1, 0.8%). The criminal charges are demonstrated in Figure 4.4 below.

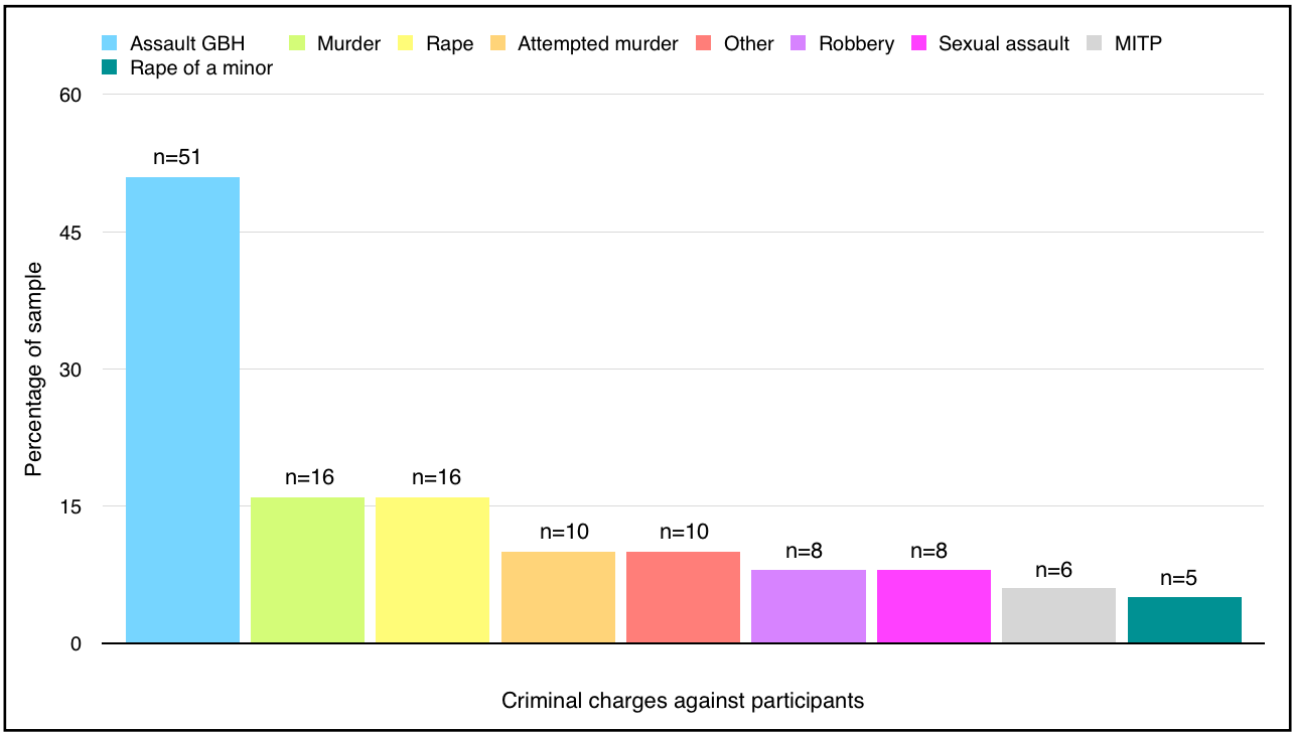

Figure 4.4 Criminal charges against participants

Seventy six participants (58.5%) reported no prior charges, with the remainder of the sample having reported at least one previous charge against them (n=54, 41.5%).

Except for those patients with intellectual disability, assault GBH was the most common charge in all other categories of psychiatric diagnoses in this study: 31.1% (n=23) for schizophrenic patients, 66.7% (n=10) for bipolar disorder patients, 53.3% (n=8) for schizoaffective disorder patients, 54.5% (n=6) of participants with a psychiatric disorder due to another medical condition, 42.9% (n=3) of substance-induced disorders patients, and 14.3% (n=1) with intellectual disability. In 57.1% (n=4) of participants with intellectual disability the charge was rape and 28.6% (n=2) rape of a minor. There was one participant with autistic spectrum disorder who was charged with attempted murder.

Figures 4.5 to 4.10 show the criminal charges amongst patients with various diagnoses.

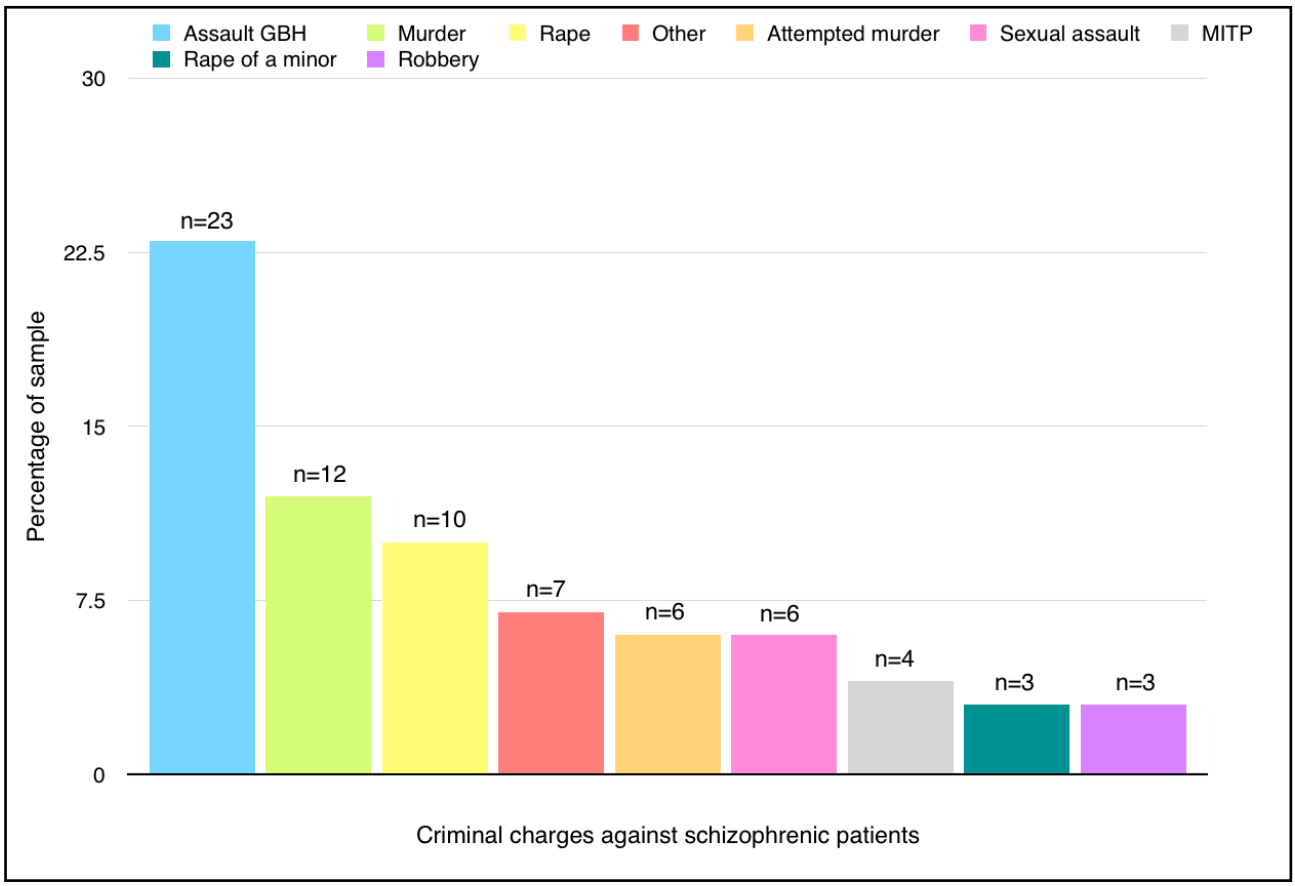

Figure 4.5 Criminal charges against schizophrenic patients

The category “Other” in Figure 4.5 on the previous page includes the following charges: arson (n=2, 2.7%), contravention of a protection order (n=1, 1.35%), attempted rape (n=1, 1.35%), conspiracy to commit murder (n=1, 1.35%), housebreaking (n=1, 1.35%) and theft (n=1, 1.35%).

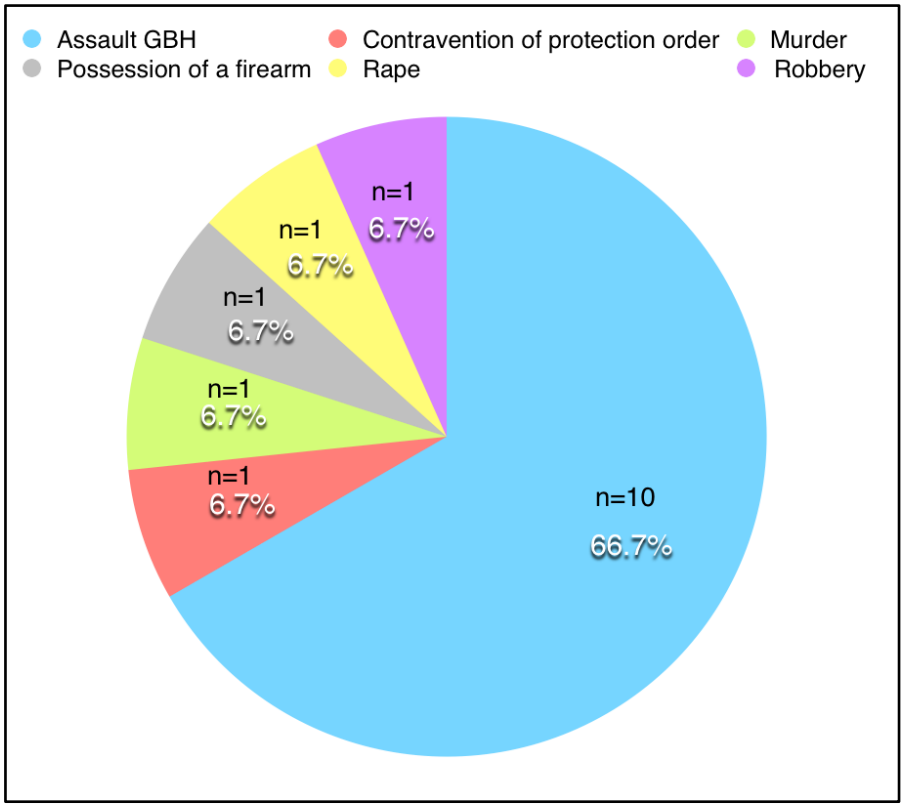

Figure 4.6 Criminal charges against bipolar disorder patients

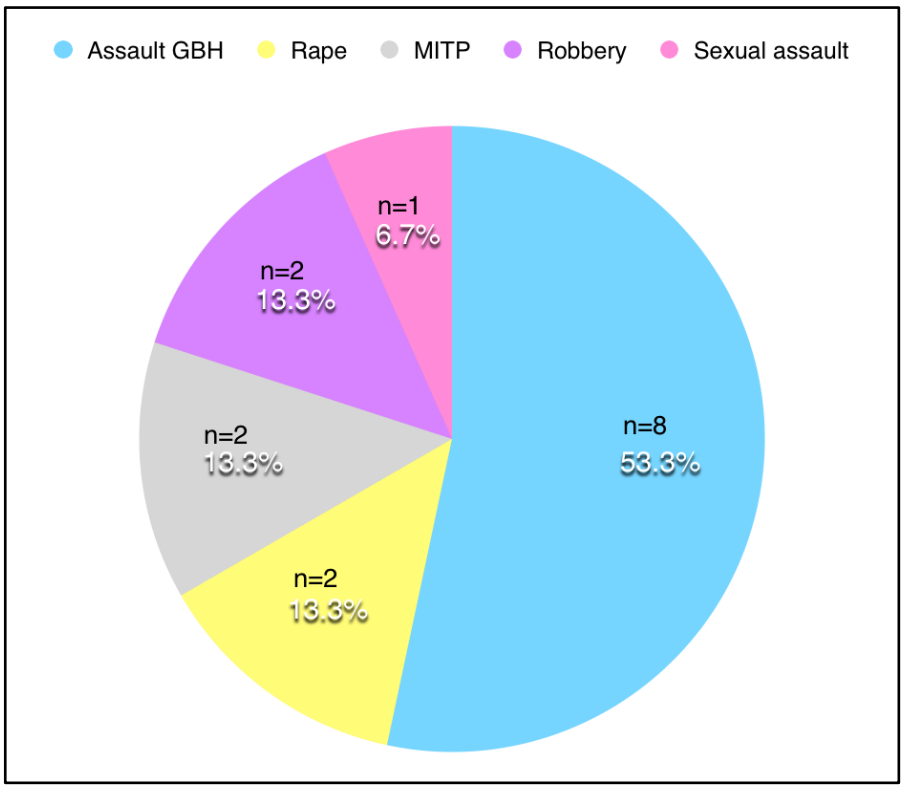

Figure 4.7 Criminal charges against schizoaffective disorder, bipolar type patients

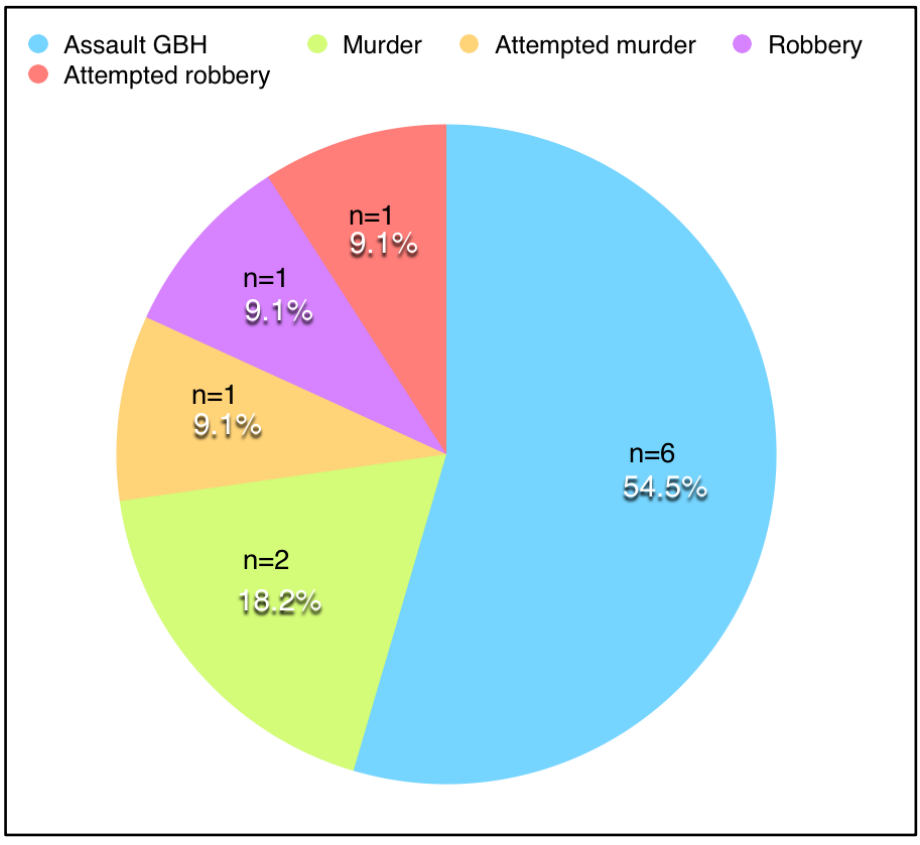

Figure 4.8 Criminal charges against those with a psychiatric disorder due to a medical condition

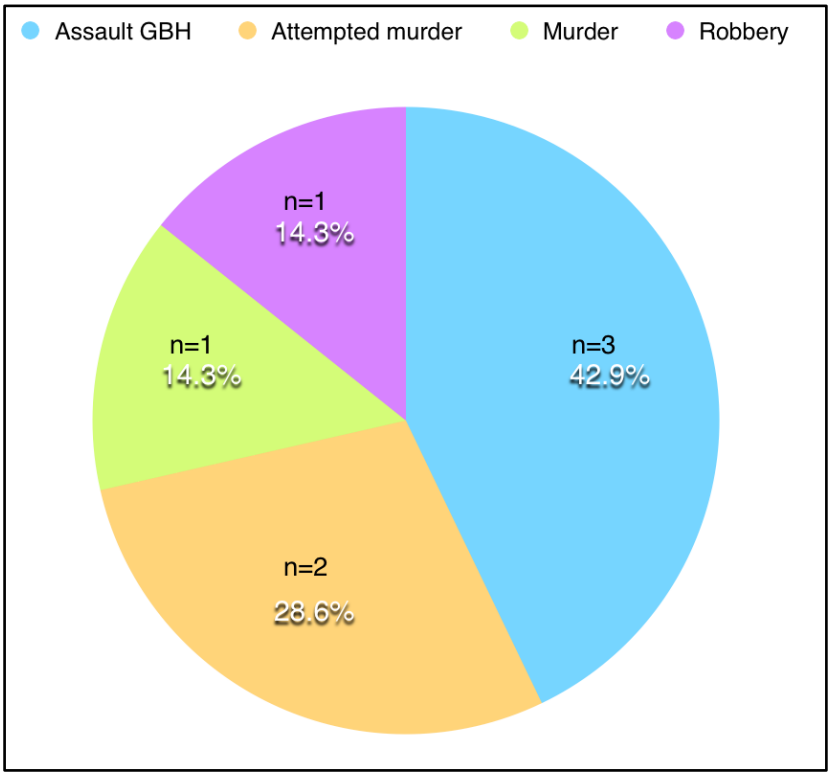

Figure 4.9 Criminal charges against those with substance-induced psychiatric disorders

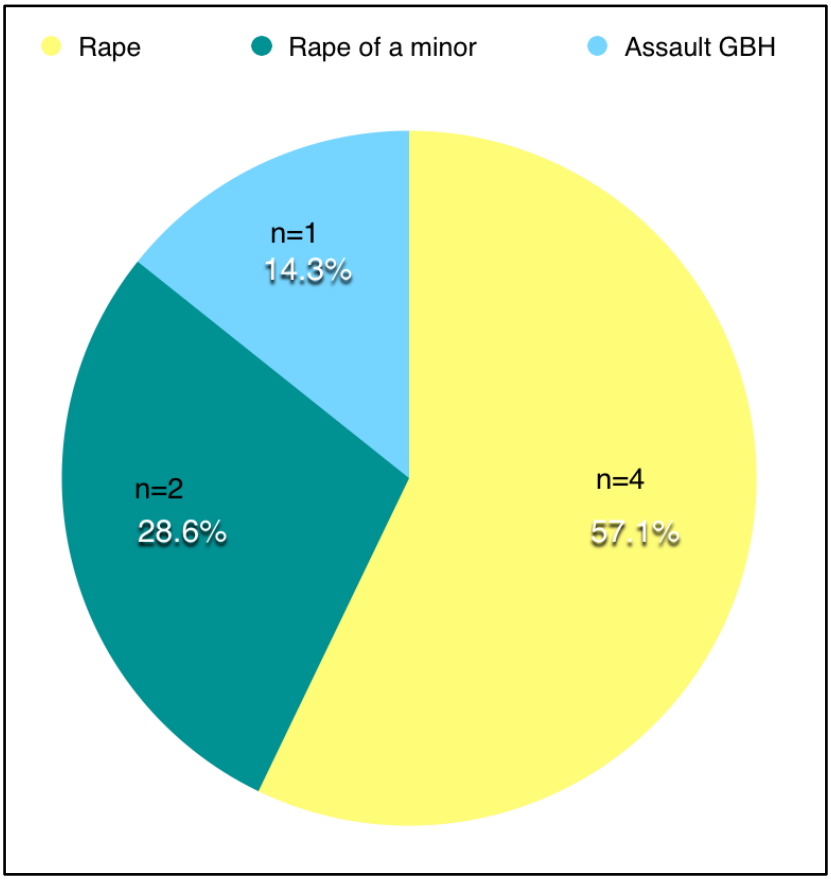

Figure 4.10 Criminal charges against those with intellectual disability

4.5 Association between the Total ACE Score and Psychiatric Diagnosis

The median ACE scores for schizophrenia and psychiatric disorders due to another medical condition were 3. Participants with a diagnosis of substance-induced disorders had median ACE scores of 6. The median ACE scores for participants with bipolar disorder and schizoaffective disorder were 5. The median ACE score for those participants with a diagnosis of intellectual disability was 2.

There was no significant association between the six most frequently diagnosed categories (schizophrenia, bipolar disorder, schizoaffective disorder of the bipolar type, psychiatric conditions due to another medical condition, intellectual disability and substance-induced disorders) and the ACE score (Kruskal-Wallis test: p=0.25). Removing the very small group of autism spectrum disorder (n=1), the small group of the substance-induced disorders (n=7) and the small intellectual disability group (n=7) from the analysis still did not change this conclusion (Kruskal-Wallis test: p=0.20). Figure 4.11 indicates the median ACE scores for each diagnosis (excluding autism spectrum disorder), with errors bars denoting the interquartile range.

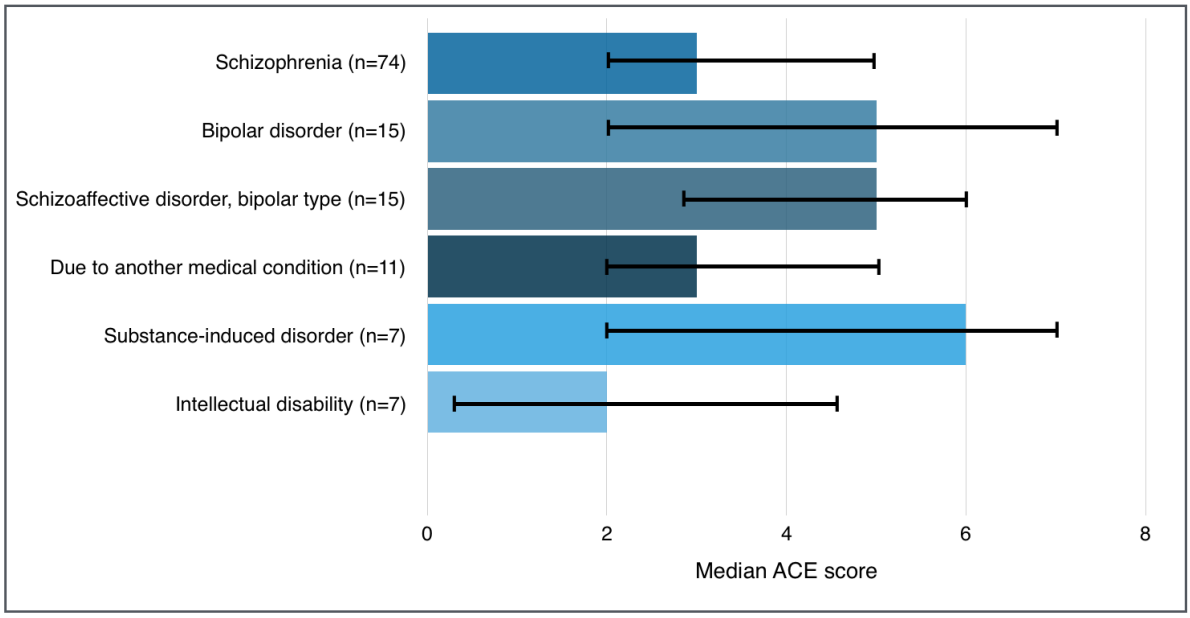

Figure 4.11 Median ACE score for each psychiatric diagnosis

4.6 Association between the Total ACE Score and Criminal Charge

The median ACE score for attempted murder was 6. Participants with either the charge of rape or robbery had median ACE scores of 4.5. The groups which had been charged with either murder or sexual assault had median ACE scores of 3.5. Participants charged with assault GBH or with MITP had median ACE scores of 3. The group charged with rape of a minor was found to have a median ACE score of 2.

The category “Other” (possession of a firearm, contravention of a protection order, arson, attempted rape, attempted robbery, conspiracy to commit murder, housebreaking and theft) was excluded from this analysis because of very small sample sizes (one or two each). There was no significant association between the categories of murder, attempted murder, rape, rape of a minor, sexual assault, assault GBH, robbery and MITP; and the ACE score (Kruskal-Wallis test: $p=0.94$). Removing the other small groups (robbery, sexual assault, MITP and rape of a minor, where $n<10$ each) from the analysis did not change this conclusion (Kruskal-Wallis test: $p=0.79$). Figure 4.12 shows the median ACE scores for each charge, with error bars denoting the interquartile range.

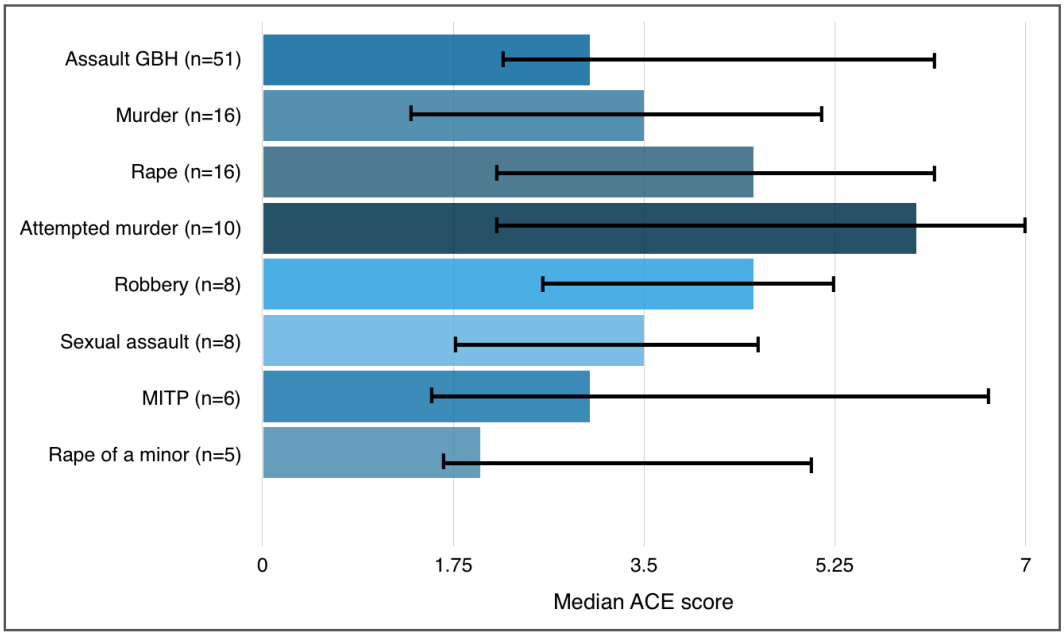

Figure 4.12 Median ACE score for each criminal charge

5.0 DISCUSSION

5.1 Characteristics of the Study Population

5.1.1 Age

The mean age of the study participants was 38 years, with a broad range from 20 years to 70 years. This is a similar age range that was found in a descriptive study conducted by Marais and Subramaney in 2015 which showed the mean age of their State patient population at Sterkfontein Hospital to be 32 years.[87] Barrett *et al* described the sociodemographic features of a population of mentally ill offenders admitted to the Free State Psychiatric Complex during the time between 2000 and 2004.[88] Their population had an age range of 14 to 67 with a mean of 30.4 years. Between 2004 and 2008 the average age of State patients admitted to the Free State Psychiatric Complex was 32.5 years.[89] These results are similar to the findings by Morgan and Del Fabbro,[90] where the average age of 293 State patients (inpatients and outpatients) at Sterkfontein Hospital was 30.7 years. In a report on the overall psychiatric admission patterns in England, it was shown that that psychiatric admissions peak between the ages of 25 and 44 years,[39] and the current study population is consistent with such patterns. This is also consistent with the findings that that there is a higher prevalence of younger people among those convicted of criminal offences.[80]

5.1.2 Gender

Males made up 96.2% of the participants. There were only five female participants. In the above-mentioned study by Marais and Subramaney the sample was 87% male participants.[87] As with most observation units, at Sterkfontein Hospital there are many more male individuals referred for forensic observation than females (89.9% versus 10.1%),[89] and subsequently more male State patients are admitted to Sterkfontein Hospital than female State patients. The findings in the current study are consistent with

the State patient profile seen in other psychiatric facilities in South Africa. For example, at the Free State Psychiatric Complex, during 2000 to 2004, 94.4% of State patients admitted were male; and between 2004 and 2008, 95.8% were male.[88,89] In other studies it has been shown that the rates of general psychiatric admissions of men outnumbers women,[13,39] and one study comparing male and female high- and medium-security admissions in England and Wales from 1988 to 1994 indicated that the annual rate of male admissions is almost six times higher than that of females.[92] Additionally, the rates of female offending are in general significantly lower than in males, although over the last twenty years there has been an increase in female offending in countries such as the USA and England. A theory that has been put forward to explain this is that women have better prosocial skills than men, and they learn these skills at an earlier age. Men and women generally commit the same types of crimes, but the rates in women are substantially lower in all categories of crime. Both male and female offenders have similar rates of psychiatric admissions.[92]

5.1.3 Marital Status and Children

More than 90% of participants were single and three quarters did not have children. At the Free State Psychiatric Complex it was found that more than 80% of State patients were single.[89] Stigma surrounding mental illness affects the functioning of patients in society which decreases the chances of a mental health care user getting married.[92] This may account for the high number of patients in this group who are single and childless. In addition, this finding is consistent with the results of a study by Acha *et al* which revealed that people admitted to a forensic psychiatric facility after committing criminal offences are more likely to be single.[80]

5.1.4 Employment

The most recently available official unemployment rate in South Africa was 26.7%, a figure published for the first quarter of 2017.[93] In this current study 88.5% of participants were unemployed at the time of the offence which is higher than in the sample from the 2004 to 2005 period where 78% were unemployed at the time of their admission to Sterkfontein Hospital.[87] It is also higher than the rate in the Free State as described in the Barrett study, in which 66.2% of their sample had been unemployed before being declared a State patient.[88] The increase in the number of those unemployed is perhaps in keeping with the general increase in South African unemployment rates from 22% in the years from 1994 to 25% two decades later.[93] Unemployment rates among mentally ill people are disproportionately large, with the highest rates of unemployment seen in patients with severe mental illnesses such as schizophrenia. In schizophrenic patients the unemployment rate has been found to be between 80% and 90%, which is consistent with the findings in the current study. The stigma surrounding mental illness is likely to play a large role in these low rates of employment.[94,95]

5.1.5 Schooling

The majority of this sample had either not attended school at all or had not completed 12 years of schooling (78.4%). This is fairly similar to the socio-demographics of the population at Sterkfontein Hospital described by Marais and Subramaney in which 83% had not completed grade 12;[87] and also in keeping with another study conducted at Sterkfontein Hospital, in which it was noted that the majority of State patients had only a primary school level of education.[90] This large number of people not completing secondary school is much higher than the figures reported for the general population in South Africa as stated in the 2017 Statistics South Africa report on educational achievement, in which it is documented that 31.8% of adults aged 25 to 64 have not completed grade 12.[96] It has

been shown previously that people admitted to a forensic psychiatric facility after having committed a criminal offence are more likely to have a lower level of educational attainment,[95] which is consistent with the current findings. In addition, research has indicated that people with schizophrenia have a lower premorbid intellectual level than those who have bipolar disorder and those with no mental illness. Their educational achievements may also be deleteriously affected by a postulated prodromal decline in cognitive functioning.[97] It has been found that patients with schizophrenia specifically (as compared to those with bipolar disorder) have poorer academic performance from the primary school level, with underachievement being noted as early as the age of six. This has been explained by the neurodevelopmental hypothesis of schizophrenia which entails cognitive and behavioural deficits developing many years prior to the onset of the typical symptoms of the disorder.[98] Therefore, the significant academic underachievement noted among the current population group could possibly be explained by the preponderance of patients diagnosed with schizophrenia within the sample.

5.2 The ACE score

5.2.1 The Median Total ACE Score

In the ACE study one third of their sample was found to have a total ACE score of 0 – that is, one third had never experienced any of the adverse experiences that are included in the questionnaire.[36] In the current study substantially fewer patients had an ACE score of 0 (just under one tenth). The low number of people in the ACE study who had never been exposed to any adverse experiences during childhood is a stark reflection of the high rate of child maltreatment that is seen in South Africa in general.[7]

The investigators in the ACE study also found that in 87% of participants more than one category of maltreatment was present.[36] The current study had a similar finding, where

79.3% of those participants who had experienced adverse childhood experiences had experienced more than one type of maltreatment. One sixth (16.6%) of the ACE study sample had ACE scores of 4 or more, and one-ninth (11.1%) had scores of 5 and above.[36] In the current study it was found that 42.4% of the participants had an ACE score greater than 4 and 27.8% had a score of greater than 5. These figures are much larger than this seen in the original ACE study, indicating that the current group of participants had higher rates of exposure to multiple forms of childhood maltreatment. The findings of the current study are similar to the findings of a study conducted by Carey regarding the prevalence of childhood sexual abuse in adolescents attending a Stress Clinic.[6] They noted that children who had been sexually abused also had significantly higher rates of physical and emotional abuse than those who had not been sexually abused. Other studies have also given evidence of multiple forms of abuse occurring together.[3,4,7,28,48]

Having a score higher than 5 was 50% more likely in women who participated in the original ACE study.[36] The very small sample size of females in the current study makes it difficult to draw conclusions, but none of the five females who participated in this study had an ACE score of 5 or more (all were 4 or less). Possibly a larger sample size would have generated findings more in keeping with the original ACE study.

Within the ACE study for which the ACE questionnaire had been developed there is no stratification of the ACE score into “low”, “moderate” or “high” exposures, and no specific cut-off value provided to delineate a “significant” score. As a result, several studies have categorised the ACE score differently.[37,38] For example, an ACE exposure score of 3 or more has been classified as high exposure by Austin *et al*.[37] They used this value because it was in accordance with the standard metric created by the Association of Maternal and Child Health Programs Life Course Metrics Project. A different study by Balisteri *et al* found

that by the time children have been exposed to four or more ACEs then the odds of having negative health outcomes in adulthood are up to twelve times higher than that of children without such exposure and so in their study a score of four was identified as being indicative of significant exposure to adverse events.[38]

In the current study the median ACE score is 3.5 which, if one considers the parameters set by the Austin study,[37] reflects a high exposure to adverse childhood experiences in this population of State patients. More than 60% of the current population of State patients had an ACE score of 3 or more which may be considered as a reflection of a large proportion of this group having a significant history of adverse childhood experiences. Therefore, it appears that in this group of forensic psychiatric patients the frequency of adverse childhood events is much higher than the frequency that has been described in the general population.

5.2.2 Measures of Emotional Abuse

Slightly less than half the participants in this study reported that they had often experienced emotional abuse in the form of being insulted, sworn at, humiliated or feeling threatened. In the ACE study conducted by Felitti *et al* in 1998 they found that 11.1% of their participants had been exposed to psychological abuse,[36] which is a number far lower than what was seen in the current study. The prevalence of emotional abuse among the State patients is also higher than the prevalence among adolescents in the general population in South Africa which was reported to be 16.1% in the Optimus study.[7] A higher prevalence of emotional abuse was found in a survey of university students in Bosnia and Herzegovina where 30% reported having been subjected to emotional abuse.[4]

5.2.3 Measures of Physical Abuse

Compared to the 10.8% of participants who had been physically abused as children in the ACE study,[36] almost 40% of participants in the current study had experienced forms of physical abuse. The prevalence of physical abuse in these State patients is more similar to the prevalence of physical abuse among adolescents in South Africa (34.4%) as described by Burton and, therefore, appears to be in keeping with available epidemiological information.[7]

5.2.4 Measures of Sexual Abuse

Although sexual abuse was the least common ACE identified in this study, almost one quarter of participants reported that they had been either touched in sexually inappropriate ways or raped when they were children.[36] In the study by Felitti *et al,* 22% of their sample had been sexually abused as children, which is similar to the results of the current study.[36] In the study by Burton *et al,*[7] which surveyed a sample of the adolescent population of South Africa, the rate of lifetime exposure to sexual abuse was 19.8% as reported in self-administered questionnaires. This rate is higher than the global average which is 12.7%.[7] It is comparable to the highest rates in the world which were described in a meta-analysis of studies from several continents that was conducted by Stoltenborgh *et al*.[22] They found that sexual abuse of female children had the highest prevalence in Australia (21.5%), and Africa was the continent with the highest prevalence for males (19.3%). In comparison to these figures the prevalence of sexual abuse in the current sample was even higher at 24.6%, indicating that the rate of sexual abuse in this population of State patients is higher than the average rate in South Africa and is higher than the highest rate reported among male children worldwide.[7,99] The wide variation seen in global statistics regarding the prevalence of sexual abuse could be attributed to differences in cultural willingness to report the abuse.[99] However, it may also be due to actual differences in prevalence of

sexual abuse of children. Some of the factors influencing the incidence of sexual abuse of children that may be relevant in the South African context and, thus, in the current population being studied may include cultural factors (involving initiation rites, myths around HIV cure), economic factors (urbanisation and migration resulting in children being left with caregivers other than the parents), and social factors (patriarchal society with an emphasis on male dominance).[99]

5.2.5 Measures of Child Neglect

Almost 30% of participants reported having experienced emotional neglect as children and 43.8% participants were subjected to physical neglect. These numbers are higher than the numbers reflected in other studies. For example, Soares *et al* reported that in their sample of adolescents in the general population that 19.7% reported having experienced emotional neglect as children.[3] In a sample of university students in Bosnia and Herzegovina,[4] more similar figures were reported with 39% having been neglected as children (physical and emotional).

A factor that influences the prevalence of childhood maltreatment that cannot be overlooked within the South African context is poverty. Although there has been evidence that the psychiatric sequelae of maltreatment in childhood are independent of socioeconomic status, poverty does impact on childhood emotional development.[12] The majority of South Africans either live in poverty or with the vulnerability of financial insecurity. Poverty and lack of economic resources results in the inability to meet essential basic human needs. Features of a life lived in poverty include a decreased ability access community resources (such as health care), malnourishment with poor quality and insufficient quantities of food, crowded households, absent father figures and high rates of unemployment.[101] Therefore, it is important to be mindful that some of the criteria that are

included in the ACE questionnaire as indicators of neglect (such as inadequate food and clothing) may be indicative of greater social injustice within the South African context rather than deliberate neglect of children.

5.2.6 Measures of Household Dysfunction

Factors that mediate the relationship between adverse events and psychiatric illness include the family context and level of family functioning which exert a positive influence on the effects of adverse experiences.[38] The two ACEs most frequently experienced by the population in this study were reflective of household dysfunction, namely divorce/ separation of parents and exposure to substance use in the household.

Almost 57% of the population interviewed in this study reported that their parents were either separated or divorced during their childhood. The divorce rate in South Africa has been described as being very high,[102] and more than half of divorces involve families with children younger than the age of 18.[103] There is also a high prevalence of parental separation. It is estimated that only 34% of South African children live in a home with both of their parents.[102] Therefore, the number of State patients in this study who report that their parents divorced or separated during their childhood appears fairly consistent with the patterns seen in the South African population. The prevalence is higher than what has been reported in studies about adverse childhood experiences from other countries. For example, in a Brazilian study 42% of adolescents had separated or divorced parents and 31% of school-age children in Norway reported parental separation.[3,21] Some reasons that have been put forward to explain the higher rate of divorce and separation seen among South African couples include factors such as work patterns, unemployment, poverty, domestic violence, and substance use.[102] Some of these factors are present within this population of State patients, such as indicators of poverty, substance use in the home and

an environment of domestic violence. A contributing factor may be the possibility that the parents were never in an official relationship and, therefore, not actually separated.

Over half of the participants in this study had grown up in a household where at least one adult was misusing alcohol or illicit drugs. In the Felitti study there were far fewer participants exposed to substance use in the household (25.6%),[36] although childhood exposure to substance use in the household was the most prevalent of the categories included in that study. The level of alcohol and substance misuse in the current study appears to be relatively high, even when compared to statistics available for South African groups. For example, the South African Stress and Health (SASH) study reported a lifetime prevalence of substance use disorders of 13.3%.[104] The World Health Organisation released a report on alcohol use in South Africa in 2014 which revealed that 58% of the South African population uses alcohol and one quarter of those display a pattern of episodic heavy drinking.[105] Another study on the epidemiology of substance use in South Africa conducted by Peltzer *et al* revealed a prevalence of substance misuse involving up to 16% of the population.[106]

Close to 40% of participants had the childhood experience of an adult member of their household being imprisoned. This figure appears to be substantially greater than the findings of the Felitti ACE study in which evidence of exposure to criminal behaviour within the household was reported in only 3.4% of the sample.[36] This high percentage is surprising as the prison population comprises only 0.3% of the South African population.[107] The ACE questionnaire does not explore the relationship of the participant to the imprisoned person, nor the reason for imprisonment, both of which may have an influence on the impact it had on the child at the time. These factors may have lead to an overinflated number being reported.

Of the participants in the Felitti study 12.5% had witnessed their mother being treated violently.[36] In the current study almost three times as many had witnessed the physical abuse of their mother or mother-figure. The association between witnessing violence and the negative effect on the child has been linked theoretically to the impact that such interpersonal violence has on the quality of parenting. It is also explained by social learning theory which leads to the intergenerational propagation of violence.[12] In this type of study it may be appropriate to consider intimate partner violence against the father, which is not included in the questionnaire. The Centres for Disease Control published a report in 2014 that revealed that although women are most impacted by intimate partner violence there is an estimated 14% of men who experience at least one episode of severe violence perpetrated against them by an intimate partner.[108] Therefore, it is possible that within the context of dysfunctional families there may be domestic violence directed towards either one of the parents.

Information from the patients' clinical records indicated that three quarters of them did not have a family history of mental illness. This is consistent with the answers given by participants in the questionnaire-based interview, during which 75% reported that as children they had never lived with anyone with a mental illness. In the Felitti study there were even fewer participants exposed to mental illness within their household (18.8%).[36] It has been calculated that between 14% to 24% of children in the USA, Europe and Asia have a parent with a mental illness such as schizophrenia, bipolar disorder and recurrent major depressive disorder.[8] The approximately 25% of the current sample that had been exposed to mental illness in their household when growing up would therefore fall within the higher bracket of such global estimates.

Child sexual abuse has been associated with parental mental illness (with a two to three fold increase in parental schizophrenia) although most cases of sexual abuse is not carried out by the biological parents.[40] There are poorer outcomes in those who have been exposed to parental psychopathology. This may be related to poorer parenting, parents experiencing more difficulty in responding to their children's behavioural or emotional problems and genetic vulnerability.[12]

5.3 Diagnosis

Reports of age at index episode, as given by patients themselves, are often unreliable because it may be a distant event (and in particular may be forgotten if the episode was mild or went untreated).[109] Therefore, the age at index presentation to mental health services was recorded using the patients' clinical files. The mean age at index presentation was 21.7 years. This finding is consistent with research previously conducted at Sterkfontein Hospital and Helen Joseph Hospital, that indicate that the first episode of mental illness is most likely to occur in people younger than the age of 30 years.[90,110] It is also in keeping with epidemiological data regarding the age of onset of psychiatric disorders.[110]

As stated previously, the most common diagnosis among the State patients in the current study was schizophrenia – almost 57% of the sample. This is similar to a recently published study conducted at Sterkfontein Psychiatric Hospital that indicated that 59% of State patients have a diagnosis of schizophrenia,[90] and with findings at the Free State Psychiatric Complex where 55.5% of State patients have been diagnosed with schizophrenia.[89] However, the number of patients diagnosed with schizophrenia in the current study is larger than what was found in slightly older studies (extending from 2000-2005) from Sterkfontein Psychiatric Hospital and the Free State Psychiatric

Complex, where 44% and 35.2% respectively of State patients had a diagnosis of schizophrenia.[87,88] The increasing number of patients diagnosed with schizophrenia is potentially consistent with the statement from the Global Burden of Disease report (2016) that indicated that the worldwide prevalence of schizophrenia is rising. This largest increase has been in the sub-Saharan African region and may be attributed to increases in population growth and ageing of the population.[112]

Bipolar disorder patients and schizoaffective disorder patients of the bipolar type were found with the same frequency in this population of State patients (11.5%). This percentage is higher for both diagnoses than what was found by both Marais and Subramaney and Morgan and Del Fabbro in studies conducted at Sterkfontein Psychiatric Hospital.[86,89] Making comparisons of studies on patients with schizoaffective disorder is difficult, as this has been noted to be a controversial diagnosis and to have poor diagnostic stability. These issues have resulted in a limited amount of research into the condition and a paucity of epidemiological data.[111]

In the current sample 8.5% of participants had been diagnosed with a psychiatric disorder due to another medical condition. This is slightly lower than the number of individuals admitted for forensic observation (12.2%) that were seen with this diagnosis at Sterkfontein Hospital between 2011 and 2012.[91] Between 2013 and 2014 it was reported that 12.2% of in- and outpatients (State patients) of Sterkfontein Hospital had a psychotic disorder due to a medical condition (head injury and epilepsy).[90]

In the current study there was only one participant who had been diagnosed with a psychiatric disorder due to HIV. One may expect to find a larger number than that, as it has been reported that up to 29% of patients with severe mental illness are HIV positive.[113]

The rates of comorbid HIV infection were not recorded in the current study. Epidemiological studies have indicated that the HIV epidemic has affected females at rates more than twice that of males, and a study conducted at a Kwa-Zulu Natal hospital indicated that between 2011 and 2013, 74% of those patients admitted with psychosis and HIV were female.[113,114] At the Luthando Neuropsychiatric HIV Clinic at Chris Hani Baragwanath Hospital 77% of patients during 2009 and 2010 were female; and of those patients, a further 70% were diagnosed with a psychiatric disorder due to HIV/medical illness.[115] The current sample included very few female patients, and therefore the presence of an HIV-related diagnosis may be expected to be lower.

Substance use is a growing problem in South Africa.[106] A South African cross-sectional population based survey of people older than 15 conducted in 2012 indicated that 4.4% had used drugs and 11.1% displayed hazardous alcohol use within the previous three months.[106] Previously it was found that the majority (71%) of State patients at Sterkfontein Hospital had a history of substance use,[86] a similar finding to that of the current study (77.7%). These figures are markedly higher than what is seen within the general population of South Africa.[106]

Within the current sample of State patients, 5.4% were diagnosed with intellectual disability. This is not representative of the overall diagnostic profile of State patients admitted to Sterkfontein Hospital. For example, in the Subramaney and Marais study, 16% of their sample were diagnosed with intellectual disability.[86] Additionally, in a study conducted at a forensic psychiatric facility in KwaZulu Natal it was found that 36.2% of State patients admitted were diagnosed with intellectual disability.[116] However, the study designs in the aforementioned reports were clinical record reviews. In the current study those patients with a level of intellectual functioning that impaired their capacity to consent

were not included in the sample. This may have also impacted on the further analysis of associations between ACE score and diagnosis.

5.4 Criminal Charge

It has been estimated that between 20% and 40% of people with severe mental illness will come into contact with the criminal justice system at some point.[89] The most common criminal charge that resulted in the participant being declared a State patient in this study was assault GBH (39.2%). This result is similar to two previous studies conducted at Sterkfontein Hospital where it was found that the most frequently found charge among the State patients.[86,89] The highest prevalence of assault GBH was seen in the patients diagnosed with bipolar disorder. People with a severe mental illness (such as a mood or psychotic disorder) are at a higher risk of offending with a violent act than those without a severe mental illness; and comorbid substance use (especially alcohol) has been demonstrated to markedly increase the risk of violence in schizophrenic patients.[73,79] A large percentage of the current population had a history of illicit substance use (77.7%), which may have played a role in the development of criminal behaviour in this group.

A charge of murder accounted for the admission of 16 participants as State patients (12.3%), which is similar to the above-mentioned studies which found that 13% and 16.7% of State patients at Sterkfontein had been charged with murder.[87,90] Of the patients with schizophrenia in the current study, 16.2% had been charged with murder. A high proportion of murder offenders have been diagnosed with schizophrenia, and rates of schizophrenia are ten times as high among homicide offenders than the general population.[73] In a forensic study conducted in Brazil it was found that the commission of a homicide was most strongly associated with a diagnosis of a psychotic disorder as compared to other psychiatric diagnoses.[80] It has previously been put forward that up to 45% of cases of

violent crime can be accounted for by persecutory delusions and auditory hallucinations, both of which are symptoms commonly seen in people with schizophrenia.[80]

In this study, attempted murder was the charge in 7.7% of cases, which is almost four times higher than previously identified rates of attempted murder in State patients at Sterkfontein Hospital (2%).[87] It is similar to the rate (7.0%) seen in State patients admissions at the Free State Psychiatric Complex.[88] Similar to murder, an attempted murder charge was also more common among those patients diagnosed with schizophrenia.

In this study, there was one participant admitted after a charge of attempted rape, and slightly over twelve percent of all the participants had been charged with rape. Morgan and Del Fabbro reported that in their sample of State patients 34.4% had been charged with rape.[90] In the Barrett study from Free State, rape had been the most common charge seen among all State patients admitted between 2000 and 2004. They reported that 26.8% of their admissions had been charged with rape.[88] Between 2004 and 2008 35.4% of State patients at the Free State Psychiatric Complex had been charged with rape prior to their admission.[89] The lower number of rape charges seen in the current study may be related to the lower number of patients with intellectual disability who were included as participants due to issues around capacity to consent. The prevalence of rape among patients with intellectual disability (85.7%) was markedly higher than in patients with other diagnoses in the current study. Unfortunately, the Barrett study did not highlight which crimes were associated with which diagnoses [88] but evidence has been put forward that the prevalence of sexual offences is higher in intellectual disability than other forms of crime.[80,117] In a Brazilian forensic study it was also noted that sexual crimes were associated with a diagnosis of intellectual disability.[80]

The group with the second highest prevalence of a rape charge was schizophrenic patients (17.6%). Although not the most common diagnosis, a study conducted at Sterkfontein Hospital between 2007 and 2009 found that 25% of people seen for forensic observation, charged with sexual offences against minors, had a psychotic disorder (substance-induced psychotic disorder excluded).[82]

The majority of studies that have assessed the associations between mental illness and criminal behaviour have focused on violent crimes, usually murder and rape, [72,80,118] and no literature could be found that investigates other offences such as robbery. The other less frequent offences in the current study (on which very little literature was found) were MITP, contravention of a protection order, housebreaking, possession of an unlicensed firearm and theft. A previous descriptive study of State patients at Sterkfontein Hospital found different rates of MITP, theft, possession of an unlicensed firearm and a similar frequency of contravention of a protection order.[87] The number of participants who had committed minor offences is low because people with such charges are usually admitted as involuntary mental health care users rather than as State patients. People who have been charged with minor offences may sometimes be made State patients because of a history of having committed (or having been charged with) multiple previous crimes, having poorly controlled severe mental illness, or for any other reason that the court may see fit.

In this study 94.6% participants were reported to have committed at least one prior offence. Although this group of State patients has high rates of abuse and neglect which have been associated with recidivist behaviour,[18] it appears more likely that this high number may be related to either unreliable record keeping in the clinical files or an unreliable history given by the patients with over-reporting of previous offences. It is a very

different finding as compared to what was found in the Marais and Subramaney study,[87] in which only a third of the State patients whose files were reviewed had reported a past criminal history. (Perhaps a more reliable method of determining past criminal activity may have been to refer to the court documents provided at the initial referral for forensic observation.) Recidivism has a higher prevalence in males,[91] those patients with underlying brain damage, non-compliance to treatment,[74,76] poor insight, antisocial personality disorder and substance use.[76,90]

5.5 Association between the Total ACE Score and Psychiatric Diagnosis

It has been stated previously that childhood abuse is associated with multiple psychiatric consequences.[33] However, there was no significant association between any of the different categories of diagnosis in this study and the ACE score. Even when the diagnostic categories with smaller sample sizes were left out of the analysis, no association was identified.

Just over 5% of this population was diagnosed with intellectual disability, and 8.5% of the participants had a psychiatric disorder due to another medical condition. In this group, it is difficult to evaluate what role adverse childhood experiences may have had on the development of their mental illness. For example, in the data collection, the age at head injury was not recorded. It is possible that a head injury could be sustained as a result of physical abuse as a young child. However, it may have been sustained in a completely unrelated manner and at an older age, and thus would not be relevant to an assessment of childhood adverse events and related development of psychiatric illness. Similarly, intellectual disability may arise as a result of birth complications or genetic disorders, neither of which is necessarily related to adverse childhood experiences such as abuse or neglect. Although there was no significant association between adverse childhood

experiences and intellectual disability, there has been a demonstrated link between childhood abuse and decreased cognitive abilities in adulthood. This relationship has been explained by low parental intelligence quotient (IQ) with a more abusive parenting style and certain genetic variants.[30]

A review of 39 studies of male and female inpatients with psychotic disorders revealed that more than 85% had experienced childhood physical, emotional and sexual abuse and physical and emotional neglect.[33] In contrast, and in keeping with the findings of the current study, a previous systematic review revealed no significant association between childhood abuse and schizophrenia (although it did identify a relationship with depression and PTSD). The authors postulated that their findings may have been influenced by potential recall bias leading to underreporting of abuse, the difficulty in excluding the influence of other types of abuse, and the challenges in identifying possible genes associated with an increased risk of different types of mental illness.[20]

The ACE study found a significant relationship with the ACE score and experiencing hallucinations (seen in 9 to 10% of their sample).[36] This relationship holds true even when correcting for substance use.[33] Therefore, in the current study in which there is a large number of patients with psychotic disorders, one might expect a significant relationship between the ACE score and the psychotic disorders, but this association was not demonstrated. The results of the current study are more in keeping with those of the prospective study conducted by Spataro *et al.*[25] They obtained contemporaneous records of sexual abuse of children younger than 16 years, and then followed the participants for any admissions to hospital. They found no association with sexual abuse and admissions for schizophrenia. It was concluded that their evidence did not support a relationship between abuse and psychosis. Morgan and Fisher conducted a literature review in 2007

addressing child abuse and schizophrenia with the aim of assessing whether adverse childhood experiences do indeed increase the risk of schizophrenia (or psychotic symptoms).[119] They discovered that there were methodological problems with the 51 studies that were included in their review. One problem identified was that diagnoses were not consistent among all the studies. Additionally, the definition of abuse and the measurement of abuse were not standardised. As mentioned previously there are differing views of what constitutes child maltreatment. Therefore, making comparisons with the current study and others that do not use the same measures, such as the ACE score, is problematic.

When weighted prevalences were calculated in the Morgan and Fisher review, it was found that the only significant association was between sexual abuse of males and psychotic symptoms.[119] In the current study 24% of the male participants had reported sexual abuse. A much larger sample size than what was available for the current study would be necessary to try to identify these associations. Morgan and Fisher concluded that the findings of research regarding the relationship between adverse childhood experiences and mental illness are not consistent,[119] and that there was insufficient evidence to support a causal relationship between these factors. It may be that studies that look rather at specific symptoms (such as positive symptoms of psychosis, for example) rather than a specific diagnosis may yield firmer conclusions.[120]

Coid *et al* did demonstrate that there was a significant association between childhood physical abuse and poor mental health outcomes but this was of PTSD, anxiety and depression which are not diagnoses seen in the population involved in the current study.[13] It has been postulated that the link between psychosis and childhood trauma lies in the presence of PTSD.[40] Rates of PTSD of up to 43% have been identified in patients with

severe mental illness who had experienced childhood trauma.[40] Additionally, it has been suggested that severe PTSD symptoms and dissociative symptoms may be misdiagnosed as a psychotic disorder.[121] There was no assessment of the presence of PTSD in the current study group, and PTSD is unlikely to be the primary psychiatric diagnosis within this population (as it is unlikely to result in an individual being declared a State patient), and therefore such an association could not be assessed. However, the assessment of PTSD symptoms could be a potential avenue for expanding this research.

It has been shown that there is an additive interaction between childhood trauma and cannabis use in the development of psychotic symptoms. Therefore, perhaps relating the ACE score with a history of substance use may have resulted in different outcomes in terms of associations with psychotic disorders. It may be that childhood trauma is associated with psychosis through an increased risk of substance use. There is a particularly significant relationship between childhood sexual abuse, the use of cannabis before the age of 16, and the development of psychotic symptoms.[122]

More than three quarters of participants in this study had a history of substance use. This rate of substance use is higher than rates found in other studies such as those by Blanchard *et al* and Buckley which indicated that approximately 50% of patients with schizophrenia use substances.[123,124] It is also higher than the rates that have been seen in studies of bipolar disorder. A systematic review and meta-analysis conducted by Hunt *et al* revealed that there is a strong association between bipolar disorder and substance use, and substance use is seen in 33% of bipolar patients.[125] The percentage of substance users in this State patient group is more consistent with the prevalence of substance use in prison inmates which is around 74%.[126] It is also consistent with Marais and

Subramaney's descriptive study conducted on State patients at Sterkfontein Hospital in which 71% of the sample had a history of substance use.[87]

Economic, political and social structures in South Africa, pre- and post-apartheid have created vulnerability to substance use.[106] The SASH study conducted in 2009 revealed that substance use is a significant social problem in South Africa with a lifetime prevalence of substance use disorders of 13.3%.[104] Perhaps the higher prevalence rate seen in the current group of State patients is also related to environmental factors in addition to the psychiatric diagnosis.

The original ACE study found strong associations between the ACE score and depression and suicide attempts.[127] In the current study, a history of depression was not explored and neither were suicide attempts. Therefore, it was not possible to assess for such as association in the current study population.

There is a paucity of literature about the relationship between childhood adverse experiences and the later development of bipolar disorder (and there appears to be a greater focus on schizophrenia, psychotic symptoms and depression).[48] There is some evidence that a history of child abuse is present in up to half of adult patients with bipolar disorder, and that one third may experience multiple types of abuse. Negative clinical outcomes in bipolar patients have been described in relation to adverse childhood experiences.[8,31,48,49] In the current study, the median ACE score among bipolar patients was 5, which does highlight that this group was exposed to quite high levels of childhood maltreatment and also experienced more than one form of abuse, although there was no significant association identified.

In the current study only the overall ACE score was used to test for associations with psychiatric diagnoses. The majority of studies assessing childhood adverse events combine different types of maltreatment, but there is evidence that there are indeed differences in the associations between different types of maltreatment and psychiatric diagnosis. For example, sexual abuse has been identified as being especially significant in the developmental trajectory of bipolar disorder.[48] Therefore, it is possible that having compared each individual adverse experience with each diagnosis in the current study population may have yielded different results. However, it is important to note that different types of adverse experiences generally do not occur individually and are most likely greatly interrelated. Therefore, it is difficult to test the associations with individual categories of adverse experience.[38] When considering the development of mental illness it is not only important to assess the severity and type of childhood trauma but also to consider the role played by genetics.[34] However, In the current sample, where there is a low prevalence of a family history of mental illness, there is a likelihood that other adverse childhood experiences may have exerted a larger influence than a genetic predisposition to mental illness. Most of the literature does show that childhood abuse and neglect do have negative consequences on future mental health but the wider socioeconomic context should be taken into consideration when assessing such effects.[128]

Other familial factors that mediate the relationship between adverse events and the development of psychiatric illness include family context and level of family functioning, both of which may exert an influence on the effects of adverse experiences and, therefore, either decrease or increase future psychiatric morbidity.[38] Some available literature points to a greater contribution of environmental adversity (such as a dysfunctional home environment) than abuse to the development of mental illness.[11,36] With such described relationships, one may have anticipated the identification of an association between

psychiatric diagnosis and ACE score because a dysfunctional family environment was described by a large number of participants in this study. However, this was not the case.

5.6 Association between the Total ACE Score and Criminal Charge

In this study, there was no significant association between the ACE score and the different categories of charges (murder, attempted murder, rape, sexual assault, rape of a minor, assault GBH, robbery and MITP), even when the categories of crime that had very small sample sizes (one or two each) were excluded from the analysis. The restricted sample size available could have affected the strengths of associations that may have been present. Therefore, there was no medium to large association between the variables, but it is possible that a larger sample may have revealed small to medium effect size associations between the total ACE score and the criminal offence. In contrast to these findings, a study that compared a normative group of male subjects and a group of males who had committed criminal activities found a much higher rate of previous traumatic events (assessed using the ACE questionnaire) in the group who had committed an offence.[17] All categories of ACE (other than neglect) were found in much higher rates among the offenders than the non-offenders, and an ACE score of 4 or more seemed to be particularly significant in the relationship with criminal behaviour (especially with violent behaviour).[17] However, the lack of associations found in this study may be in keeping with the results of studies that have shown that children exposed to maltreatment are not more likely than non-maltreated children to go on to be adults who commit criminal offences.[68, 69, 70, 71]

Factors that have been noted to decrease the likelihood of an individual committing a violent crime include an environment of strong social support and the presence of strong attachment figures.[74] In this study population the most common adverse childhood

experiences were those reflective of household dysfunction, and therefore those patients were lacking in these protective factors. However, it is not possible to draw conclusions about any associations in the current study due to the small sample size.

A cohort study conducted by Fazel *et al* in Sweden followed up males and females with schizophrenia between 1973 and 2004.[118] They found that during that time 17.1% of men and 5.6% of women had a conviction for a violent crime. When they assessed which socio-demographic factors were associated with an increased risk of violent offending, they found that having a family history of parents committing violent crimes was moderately associated with violence among the schizophrenic cohort. Therefore, familial (either genetic or environmental, or both) risk factors were said to contribute to the development of violent offending in schizophrenic patients. Although the current study does examine whether or not the participants had, as children, been exposed to criminal behaviour in the household, the questionnaire does not specify which person from the household had been imprisoned, nor the type of crime (i.e. violent or not) that the person had committed. The questionnaire also does not stipulate the length of time the participant had lived with that individual, nor the strength of relationship they had shared. It is possible that in situations where they had lived together for a short time only, or had not shared a close relationship, that the effect of that person being imprisoned may not have had a significant impact on the study participant.

6.0 LIMITATIONS

The main limitation of this study is the small sample size, which means that smaller associations between the variables could not be detected. Unfortunately, only medium to large relationships could be assessed. The small sample size also makes it difficult to produce generalisable conclusions about psychiatric patients who have experienced adverse childhood events. It should be highlighted that this sample is from a specialised forensic psychiatric population, and thus findings cannot be extrapolated to the general psychiatric population. The sample size was limited by the number of State patients being treated as inpatients at the hospital during the time of the data collection. A further limitation was the number of patients who were identified by their treating multidisciplinary teams as being capable of giving consent to participate in the study.

There are important ethical considerations when undertaking research of this nature. Although there are potential benefits of such research to these patients (improvement of patient management/treatment) and to society (through better understanding of the links between mental illness, developmental history and criminal behaviour), one must acknowledge that State patients are an especially vulnerable group to include in research projects. The nature of their mental health problems may negatively impact on their ability to decide to consent to participate in the study. They may feel coerced to participate because of fear that not doing so may have a negative impact on their management (for example, not being granted leave of absence).[128] These issues must be accounted for when selecting potential participants for research projects.

One of the problems identified with making comparisons among studies about childhood maltreatment is the differing methods of identifying abuse and of collecting this

information.[41] The ACE questionnaire relies entirely on self-reporting of adverse events in childhood. It is possible that this may lead to unreliable participant responses, and underreporting due to embarrassment and stigma. Due to the difficult socioeconomic environment in which many South Africans find themselves[101] it could be that some participants may not perceive a certain experience as abusive (for example, inadequate clothing), whereas others might view the same experience as maltreatment. Attempts to corroborate the reports of abuse were not practical in terms of the scope of this study, but could be considered as a factor to include in a larger study.

The majority of participants in the current study were diagnosed with a psychotic disorder. Most studies involving individuals with psychiatric disorders have relied upon retrospective reporting of traumatic events.[4,15,17, 36-38,40,48,49,76] There are concerns that retrospective study designs may produce unreliable and inaccurate information because of difficulties with accurate recollection of past events. These effects might be compounded by the cognitive impairments, delusional beliefs, and detachment from reality associated with psychosis.[123] However, the results of an analysis of data conducted by Fisher *et al* indicate that histories of childhood adversity obtained retrospectively from psychotic patients are reasonably reliable as reports of adversity have been demonstrated to be fairly stable over a long period of time.[130] Current psychiatric illness does not appear to influence reliability of self-reports,[33,40,125] and previous studies have shown that reports of childhood abuse by individuals with schizophrenia are as reliable as those made by the general population.[33,124]

The quality of record-keeping has a large influence on the data that is collected in a retrospective clinical file review. It is possible that over the time that a patient has been admitted (usually long period for State patients), certain information may have been incorrectly recorded. The criminal charges and the diagnoses were obtained from the

clinical files and were dependent on notes made by the treating clinician. It was noted that for some participants the diagnoses had changed over time, but it was not always clear as to what the basis of the change was. It was also found that in a disproportionate number of participants there was a history of prior offences recorded (not necessarily actual criminal charges), but when this figure was compared to a previous descriptive study done at Sterkfontein Hospital it appeared that this figure was unreliable.[86]

A notable limitation of this study is that more detail with regards to the patterns of substance use among this population was not obtained. More information with regards to a diagnosis of a substance use disorder, severity and types of substances used may have been more useful that just noting that there was a history of substance use. This should be addressed if this research is expanded upon. Another diagnostic category that was not included was that of personality disorders. Previous research has indicated a strong correlation between the presence of a personality disorder and criminal behaviour.[80] As the current study focused on the primary diagnosis of the State patient, personality disorders were not included, but would be an important area to explore.

7.0 RECOMMENDATIONS

There is a paucity of published research (beyond reviews of the profiles of forensic patients and observation cases) emanating from the field of forensic psychiatry in South Africa. The study of forensic epidemiology is of importance in the development of an understanding of forensic events.[80]

Another difficulty associated with conducting forensic psychiatric research is the limited number of forensic psychiatric facilities in South Africa.[87] The aetiological link between psychiatric disorders and criminal behaviour is very complex,[80] and there is a gap in the research regarding the developmental trajectory in people who develop both mental illness and criminal behaviour.[87] In South Africa, people who have committed criminal offences while mentally ill are detained in specialised hospitals in order to receive care, treatment and rehabilitation. An understanding of the protective and risk factors that underlie the development of both mental illness and criminal behaviour is crucial to guide intervention programmes that may be offered in such facilities.[80]

Questioning around childhood trauma is often neglected during history-taking with patients.[32] Physician awareness of the prevalence and consequences of childhood maltreatment is important and should be enquired about routinely when taking a history.[17] This information may assist in planning more appropriate and holistic psychotherapeutic and psychosocial interventions for State patients.[31] It is vital to assess what aspects of these early traumatic events are particularly damaging and what aspects lead to future difficulties.[17] Such an assessment forms an important part of understanding the psychiatric sequelae of negative childhood experiences, the impact on adult behaviour, and the difference that early intervention may make in high risk groups. The effects of childhood

trauma are preventable and treatable. Failure to address this potentially enduring dysfunction at a critical time of childhood development can have an impact on psychological wellbeing that extends into adulthood.[6]

Interventions for those who have experienced childhood maltreatment may assist not only the mental health of that individual, but also with decreasing the incidence of violent crimes in society overall.[15,16] It has been highlighted that treatment models that focus purely on the offence that was committed, and that neglect to address issues within the early lives of offenders, are unlikely to reduce the potential for repeat offences.[17] Many of the recognised risk factors for criminality are not attenuated by treatment with medication. Issues such as social isolation, lifestyle instability and emotional dysfunction continue if an integrated psychosocial treatment model is not adopted with the specific intention to reduce risk. The underlying risk factors and the complex mechanisms in the development of mental illness and of criminal behaviour need to be taken into consideration so as to provide State patients with an integrated comprehensive rehabilitative treatment programme.[83]

In terms of recommendations to expand this on this topic of research, it would be of interest to consider the relationship between the different types of adverse childhood experiences and the associations of each of these with different psychiatric diagnoses and criminal charges. A further expansion could include information about additional psychiatric diagnoses such as personality disorders or trauma-related disorders. In addition, it is recommended that the study be continued over a longer period of time so as to increase the sample size, allowing detection of smaller associations between variables. Another area of expansion of this research could be to include more detail regarding specific substance related diagnoses.

8.0 CONCLUSIONS

The two most frequently experienced adverse childhood experiences were reflective of household dysfunction, and sexual abuse was the least commonly reported. There was no significant association found between the diagnosis and the ACE score, and there was also no significant association found between the seven categories of criminal charges and the ACE score.

The sequelae of the experience of maltreatment, and the development of psychiatric illness and criminal behaviour, are of such complex nature that it is likely that numerous factors interplay with varying degrees of influence. Understanding potential mechanisms underlying mental illness and criminality is essential when developing a comprehensive treatment plan for State patients. A comprehensive treatment plan that addresses their adverse experiences may potentially improve outcomes for State patients. This information will also assist in the assessment of risk of potential further criminal behaviour. In order to do so, further knowledge is required about the relationship between childhood maltreatment, mental illness and criminal activities.

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APPENDIX A: THE ACE QUESTIONNAIRE

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household often or very often... Swear at you, insult you, put you down, or humiliate you?
or
Act in a way that made you afraid that you might be physically hurt?

Yes No

2. Did a parent or other adult in the household often or very often... Push, grab, slap, or throw something at you?
or
Ever hit you so hard that you had marks or were injured?

Yes No

3. Did an adult or person at least 5 years older than you ever...
Touch or fondle you or have you touch their body in a sexual way?
or
Attempt or actually have oral, anal, or vaginal intercourse with you?

Yes No

4. Did you often or very often feel that ...
No one in your family loved you or thought you were important or special?
or
Your family didn't look out for each other, feel close to each other, or support each other?

Yes No

5. Did you often or very often feel that ...
You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?
or
Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

Yes No

6. Were your parents ever separated or divorced?

Yes No

7. Was your mother or stepmother:
Often or very often pushed, grabbed, slapped, or had something thrown at her?
or
Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard?
or
Ever repeatedly hit at least a few minutes or threatened with a gun or knife?

Yes No

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?

Yes No

9. Was a household member depressed or mentally ill, or did a household member attempt suicide?

Yes No

10. Did a household member go to prison?

Yes No

ACE Score:

APPENDIX B: DATA COLLECTION SHEET

	1	2	3	4	5	6	7
AGE							
AGE AT INDEX							
GENDER	Male	Female					
DIAGNOSIS	Schizophrenia	Schizoaffective disorder - bipolar	Schizoaffective disorder - depressive	Bipolar Disorder	Substance induced disorder	Due to another medical condition :	Other:
TREATMENT RESISTANCE	No	Yes					
SUBSTANCE USE	No	Yes					
CHARGE	Murder	Rape	Rape (of a minor)	Assault GBH	Robbery	Other:	
REPEAT OFFENDER	No	Yes					
MARITAL STATUS	Single	Cohabiting	Married	Separated	Divorced	Widowed	
CHILDREN	No	Yes					
HIGHEST LEVEL OF EDUCATION	None	Primary	Secondary	Matric	Tertiary		
EMPLOYMENT AT TIME OF OFFENCE	No	Yes					
FAMILY HISTORY	No	Yes					

APPENDIX C: ETHICS APPROVAL

R14/49 Dr Nikki Eklektos

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M151130

NAME: (Principal Investigator)	Dr Nikki Eklektos
DEPARTMENT:	Psychiatry Sterkfontein Hospital
PROJECT TITLE:	An Assessment of the Link Between Childhood Trauma, the Development of Mental Disorders and Criminal Behaviour within a Forensic Population
DATE CONSIDERED:	27/11/2015
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Ryola Singh
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	18/01/2016

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 10004, 10th floor, Senate House/2nd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**.

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES