PTSD and Violence

by

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A thesis submitted to

The University of Birmingham

For the degree of Doctorate in Forensic Psychology Practice
(ForenPsyD)

Centre for Forensic and Criminological Psychology

University of Birmingham

February 2013

Abstract

This thesis aims to explore the role of trauma in an individual's pathway to violence. Professionals consider offenders' history of trauma when assessing risk of violence, and research has found an established relationship between Post-Traumatic Stress Disorder (PTSD) and perpetration of violence. Military populations may be particularly vulnerable to this relationship. The introduction explores relevant theories. The second chapter presents a systematic review of literature relating to the relationship between PTSD and violence in military populations. Few mediating psychological processes have been identified, therefore the role of cognition is considered. Chapter Three examines the psychometric properties of a measure of violent thoughts – the Firestone Assessment of Violent Thoughts (FAVT). This measure is used alongside the Schedule of Imagined Violence (SIV) in a research study in Chapter Four which aims to empirically assess the role of violent cognitions in mediating the relationship between PTSD and violence in a military population. The results support the relationship between PTSD and violence, PTSD and violent cognitions, and violent cognitions and violent behaviour. Violent fantasy measured by the SIV mediated this relationship. However, the violent thoughts measured by the FAVT did not account for a sufficient amount of the variance, suggesting there are other mediating factors. These findings are discussed in the final chapter contextualised in the literature and the implications for practice. Finally, it is considered whether a unique pathway to violence exists for military populations with PTSD, and a model of this pathway is presented based on the findings of this thesis.

Dedication

For my brave husband, for all your patience and assistance

For my inspirational sister and brother-in-law

For my parents who never let me fall

For Rhys

Acknowledgements

Thanks to Dr Leigh Harkins and Professor Brian Thomas-Peters for their great minds!

Thanks also to Sue Hanson for her organisation and support, and the staff at the University of Birmingham Centre for Forensic and Criminological Psychology.

Finally, many thanks to the service men and women in the UK, with special thanks to those who agreed to take part in this research, and to Combat Stress for looking after them for us.

Weapons

There are many types of weapons

But the ones that hurt the most

Are the weapons made of memories

And the deadly midnight ghost

Not all wounds are red and bloody

...There are wounds that touch the mind

These are wounds that always fester

They’re the never healing kind

Why are we who’ve done our duty

Plagued by wounds that never heal

Made by weapons of our memories

Which are worse than lead and steel

Anon

(Gearing, 2011)

Contents

Word Count: 39,711

List of Figures

List of Tables

List of Appendices

Chapter One: Introduction

Professionals involved in the assessment and treatment of violent offenders often partially attribute the development of violent behaviour to the individual's previous traumatic experiences. This could include suffering childhood abuse, sudden bereavement, witnessing violence or any other adverse events in the individual's lifetime. Indeed, structured risk assessments such as the Historical Clinical Risk-20 version three (HCR-20-v3) cite traumatic experiences as a risk factor for later violence (Douglas, Webster, & Hart, in press). There may be different processes that occur following a traumatic experience that increase the risk of later violence. One explanation may be Post-Traumatic Stress Disorder (PTSD). Chapter One explores the prevalence of PTSD and violent behaviour, as well as the theories that may explain this relationship.

Post-Traumatic Stress Disorder (PTSD)

PTSD is an anxiety disorder that can develop as a response to traumatic experiences and leads to symptoms such as flashbacks and hypervigilance. Research suggests the prevalence of PTSD is higher in prison populations than in the general population (Goff, Rose, Rose, & Purves, 2007), and PTSD has been found to be associated with increased risk of violent behaviour (Collins & Bailey, 1990; Jakupcak & Tull, 2005; Parrott, Drobes, Saladin, Coffey, & Dansky, 2003). This finding is even more prevalent amongst military populations (e.g., Beckham, Moore, & Reynolds, 2000; see Chapter Two). In particular, many studies of criminal behaviour in military personnel have focused on Vietnam veterans in the US. The National Vietnam Veteran Readjustment Study (NVVRS, Kulka et al., 1990) in the US found that 50% of those Vietnam veterans suffering PTSD had been arrested for a violent offence, and 34.2% had been arrested more than once (Kulka et al., 1990). Vietnam veterans with PTSD also self-reported an average of 13 acts of violence over the previous 12 months, compared to 3.5 violent acts reported by veterans without PTSD. Similar results could be anticipated for military populations who have been involved in other large scale conflicts.

Military Populations and PTSD

There are fresh concerns over the troops returning from the conflicts in Iraq and Afghanistan, both conflicts which share similar characteristics to the Vietnam war (Howard League, 2011). Booth-Kewley, Larson, Highfill-McRoy, Garland, and Gaskin (2010) studied 1,543 US marines deployed in Iraq and Afghanistan during the period of 2002 to 2007. They found

five factors that were associated with subsequent anti-social behaviour: PTSD, stress during deployment, level of combat exposure, younger age, and being divorced. When the other factors were controlled for, individuals with PTSD were six times more likely to engage in anti-social behaviour, showing the strongest association of all the factors studied.

Prevalence. Attempts have been made to discover the number of veterans in the criminal justice system, including those in custody and those supervised by probation. The National Association of Probation Officers (NAPO, 2009) estimates 6% of those supervised by probation are veterans. They also estimate a further 9% of the prison population are veterans (NAPO, 2008). A Defence Analytical Services and Advice report (DASA, 2010) gives a snapshot taken on the 6th November 2009, indicating 2,207 records of service leavers matched against the 81,071 prisoner records. Therefore 2.7% of prisoners were ex-Armed Forces. This was revised up to 3.5% due to an additional 613 prisoners being thought to be older veterans who exited the forces prior to a record of service being kept. According to the DASA report, of those veterans in prison, 77% were ex-Army, 15% were ex-Navy, and 8% were ex-Air Force. The large majority were male (99.6%), British nationals (96.7%), and in non-commissioned ranks (92.2%; 6.8% had missing rank). The ages of the veterans were as follows: 20% were aged between 26 and 34 years, 19% were aged 35 to 44, 22% were aged 45 to 54, and 17% were aged 55 to 64 years. Few committed their offence within a year of leaving the Armed Forces (6%) but 22% had begun their current prison sentence within five years of leaving the Armed Forces, and 41% within ten years. The most common offences were violence against the person (33%) and sexual offences (25%). DASA have estimated 32.9% of veterans are in prison for violence compared to 28.6% of the non-veteran prison population. However, it must be borne in mind that the proportion of the general population in prison is still 43% greater than the proportion of regular veterans in prison (DASA, 2010).

In considering veterans' pathways into aggression, many case studies were identified by NAPO (2008, 2009). NAPO contacted all probation areas in 2009 requesting case studies for any offenders who had reported a history of serving in the Armed Forces. Of all the 42 probation areas, 30 responded with a total of 90 case studies. Of the case studies, the most common conviction was for domestic violence, in 39 cases (43%). Convictions for other forms of violence were reported in 18 further cases (20%). In ten cases their conviction was for offences against a child, usually sexual (11%). There were five cases with convictions for serious driving offences and two cases with convictions for burglary, one for robbery and one

for blackmail. They found alcohol use was reported in 39 cases (43%), and drug misuse was an issue in 13 cases (14%). Of the 90 case studies, 24 were reported by their probation officer to be suffering from PTSD (27%), although this included undiagnosed cases. A further 19 cases were reported to be suffering from depression or behavioural problems (21%). Only some of the cases gave details of where they had been deployed; ten had served in Northern Ireland, 12 in Iraq, 11 in Afghanistan, and seven in Bosnia.

NAPO previously carried out a similar study in prisons in 2008 and achieved a response of 74 case studies in 22 of the 42 probation areas, detailing 71 individual offences. Although the exact nature of eight offences were not specified, 71% of the remaining 63 were violent. The majority of the offences detailed in the report were alcohol or substance related (62%), and the majority of offenders were suffering from PTSD or depression (69%). In addition, the report contains more general reporting from probation officers of a number of men, convicted of violent offences, who say that have seen active service in the Middle East. Many of these have been given a diagnosis of PTSD, and alcohol and substance misuse are common features in their cases.

Politically, there is current interest in supporting veterans in the criminal justice system. The Howard League has conducted a recent inquiry into former Armed Forces personnel in prison (The Howard League, 2011). Following a review of the evidence, they estimate the proportion of the prison population who have previously served in the Armed Forces is between 5% and 10%, indicating that between 4,000 and 8,300 prisoners have served in the Armed Forces. They also found that the vast majority are male, and served in the Army or Marines. As a witness for the enquiry, Professor Simon Wessely from Kings College commented that approximately 2% of Armed Forces personnel suffer from PTSD and this rate does not appear to be increasing (Howard League, 2010a). He also highlights that whilst there may be some individuals who do end up committing offences and even going to prison because of what happened to them during their service, there may be many other individuals who might have ended up with similarly poor outcomes had they not joined the Armed Forces, due to the backgrounds they are recruited from. However, as Major General Mike Von Bertele, Director of the Royal Army Medical Corps, also stated in the Howard League consultation (The Howard League, 2010c) it is difficult to join the Army with a pre-existing criminal record, especially with a record of violent crime.

Available support. The Ministry of Justice, alongside the Ministry of Defence, have produced a guide for professionals working with veterans in custody, and professionals have set up a scheme to identify veterans in prison, known as the Veterans in Custody Scheme (VICS). A national workshop was convened in order to educate prison and probation staff in the problems experienced by some veterans, including resettlement, mental health, employment, and housing. Co-ordinated working is encouraged with veterans' agencies and charities such as: Combat Stress; The Soldiers, Sailors, Airmen, and Families Association (SSAFA); The Service Personnel and Veterans Agency (SPVA); and The Royal British Legion. Psychiatric support is available through a centralised targeted NHS organisation known as the Medical Assessment Programme (MAP). The MAP provides mental health assessment for veterans and management advice for professionals involved in the care of veterans in the NHS mental health services.

Thesis Rationale

On the basis of investigations so far, it seems within the UK criminal justice system between 3.5% and 10% of prisoners are ex-Forces personnel (NAPO 2008, 2009; DASA 2010; Howard League 2011). These individuals are mainly males who served in the Army in non-commissioned ranks (NAPO 2008, 2009; DASA 2010; Howard League 2011). The most prevalent offence committed by ex-service personnel is violence against the person (DASA 2010), most often domestic violence (NAPO 2008, 2009). This is reflected in research in the US which found the incidence of domestic violence is higher in military than in civilian families (Cronin, 1995). Many of the UK veterans are reported to have mental health difficulties, most often PTSD (NAPO 2008, 2009). Although PTSD is not the most prevalent mental health diagnosis amongst military personnel, there is a higher rate than in the civilian population (Fear et al., 2010). There are a number of other risk and protective factors that may have influenced these cases; however PTSD is one potential characteristic that is more prevalent in the military personnel/veteran population which has been linked to the perpetration of violence.

This suggests there may be some mediating psychological processes between the experience of PTSD and violent behaviour. Theories that explore psychological processes leading to violent behaviour are explored below, along with theories of PTSD. These theories are then considered in relation to how the symptoms of PTSD may mediate the relationship between

PTSD and violence, such as changes in the way the individual perceives the world, the normalisation of the use of violence, and increases in levels of anger.

Cognitive Theories of PTSD

The symptoms of PTSD are set out in the Diagnostic Statistical Manual, fourth edition, text revision (DSM-IV-TR, American Psychological Association, 2000). PTSD results from experience of a traumatic event which involves actual or threatened death or serious physical injury to the person or to others, and the person felt intense fear, horror or helplessness. In PTSD, the traumatic event is persistently re-experienced and stimuli associated with the trauma are avoided. Alongside this, there can be numbing of general responsiveness, as well as increased levels of arousal. These symptoms are considered representative of three distinct clusters: the re-experiencing cluster, the hyper-arousal cluster and the avoidance/numbing cluster. The duration of the symptoms must be more than one month and cause clinically significant distress or impairment in social, occupational, or other important areas of functioning for a diagnosis to be made. There are numerous validated measures that are used for diagnosis of PTSD under these criteria, such as the Structured Clinical Interview for DSM disorders (SCID; First, Spitzer, Gibbon, & Williams, 1996).

Many trauma theories hypothesise that traumatic events produce changes in the victim's thoughts and beliefs. Traumatic experiences challenge previously held beliefs, shattering assumptions that the world is safe, others are trustworthy, and the self is competent (Janoff-Bulman, 1992). PTSD may result from problems integrating the new information related to the trauma with previously held beliefs about the world or 'schemata'. Epstein (1991) identified four core beliefs which he suggested may change after a traumatic experience: the belief that the world is benign, that the world is meaningful, that the self is worthy, and that people are trustworthy. Similarly, McCann and Pearlman (1990) suggested traumatic events cause disruptions in beliefs about safety, trust, power, esteem, and intimacy. Foa and Rothbaum (1998) proposed two basic dysfunctional cognitions in the development of PTSD: the world is *completely* dangerous, and one's self is *totally* incompetent.

The Ehlers and Clark cognitive model of PTSD (2000) also identifies some potential negative appraisals of the self, the world, and others following a trauma, such as "I am not safe", "I deserve bad things to happen to me", "other people think I am weak", and "I cannot rely on other people" (Ehlers & Clark, 2000). These appraisals may lead to a perception of threat

and elicit particular emotions such as fear, anxiety, and anger. Individuals are more likely to attend to information that supports their beliefs rather than contradicts them, which helps to maintain these beliefs.

The Post-Traumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) was designed to identify beliefs associated with traumatic experiences related to the self, the world, and self-blame. These include items describing mistrust of others, feelings of inadequacy or poor control, and expectation of threat. These appraisals could develop into more generalised schemata about the world, self, and others that lead to negative appraisals of other situations.

Cognitive theories of PTSD identify changes in cognitions as a result of traumatic experiences, and these may be generalised to other situations. The impact of these cognitions is considered within the context of established theories of violence.

Theories of Violence

Cognitive Neoassociation Theory of aggression (Berkowitz, 1990) proposes that associations between stimuli, thoughts and affective states are stored and when one is activated, all associated thoughts and affective states are primed also. Those stimuli, thoughts, and affective states that are associated more often are more likely to be activated simultaneously in the future. Therefore, aversive events induce negative affect which automatically stimulates negative thoughts and memories, and physiological responses. Excitation transfer theory (Zillman, 1983, 1988) suggests these physiological responses, such as a raised heart rate and increased sweating, may lead an individual to interpret this as evidence that they are feeling angry, triggering cognitions related to anger such as "why are people getting at me", and increasing the perception of anger (Ireland, 2009). Therefore, the physiological changes and how they are interpreted, alongside anger cognitions, may impact the behavioural response or 'script' selected.

Information processing. Behavioural scripts are fundamental in Huesmann's information processing model of aggression (1988) which focuses on the impact of cognitive processes in learning how to deal with social interactions and in guiding behavioural responses. He suggests an individual acquires scripts for how particular social situations should play out on the basis of previous observation of others and reinforcement. These scripts form part of the

individual's schemata about the world, self, and others which are built up based on previous knowledge and experience. Those scripts that fit with previously acquired scripts are preferred. Presented with a social scenario, the individual is then thought to select the script they feel is most appropriate to the situation they find themselves in based on their schema about that situation. The selection of this script is influenced by the individual's interpretation of the event, their emotions and level of arousal at the time, as well as the accessibility of a script. The interpretation of the situation may be based on cues associated in memory with previous experiences of similar situations, as well as associated beliefs or schemata. The most accessible scripts are the ones that have been used or rehearsed most often, or have been most successful, and those that are primed by a wide range of different cues. Other factors influencing the selection of a script may include the limited availability of alternatives. Some individuals may have developed very few, more complex alternatives, or lack the resources to apply them, therefore resort to applying aggressive scripts. Scripts can become generalised to more situations the more they are applied in a range of scenarios.

Violent fantasy. In his model, Huesmann (1988) considers running a script in one's imagination to be rehearsal of that script, therefore making the script more easily accessible. On this basis, fantasising about a violent scenario would represent cognitive rehearsal of a violent script, therefore increasing its accessibility. Guerra, Huesmann and Spindler (2003) suggest aggressive cognition and fantasy can serve to normalize violence and increase the likelihood of violent behaviour. Studies with children have investigated the impact of their fantasy life on their behaviour. Guerra et al. (2003) found the relationship between exposure to aggression and aggressive behaviour was mediated by aggressive cognitions in 4,458 children in the US. Also, Smith, Fischer, and Watson (2009) found aggressive fantasising was only associated with aggressive behaviour in children when there was also exposure to violence, and that exposure to violence was only associated with violent behaviour when accompanied by violent fantasy. They suggest this could either indicate that the effect of aggressive fantasising on aggressive behaviour is exacerbated by the normalisation of violence through witnessing it, or that the relationship between violence exposure and violent behaviour is exacerbated by the rehearsal of violent scripts. These studies have highlighted that this relationship between fantasy and behaviour only exists when the individual has actually witnessed violence, as well as fantasising about it.

Integrated theory. In an attempt to integrate the numerous overlapping theories of aggression, Anderson and Bushman (2002) have proposed a 'General Aggression Model' (GAM). The GAM considers the situational factors; the individual's predisposing factors; the cognitive, affective, and arousal states that act as routes to violence; and the appraisal and decision making processes that lead to violent action. Situational factors contributing to violent behaviour could include any aversive physical conditions, as well as aggression priming cues, provocation or frustration, physical discomfort, material incentives, and substance use. Individual predisposing factors included in the model are biological predispositions, personality traits, perceptual and person schemata, and previously learnt scripts. The witnessing of violence is thought to influence these predisposing factors, reinforcing aggression related knowledge structures. These previous knowledge structures are thought to develop out of experience and influence the perception of the individual. The more they are used they are automatically triggered in response to the associated situational factors, and in turn trigger affective states, beliefs, and behavioural responses. Therefore, any previous associations between past experiences and beliefs, emotions, cognitions, and behavioural scripts may be triggered. Within a specific situation, the routes into violence are perceived in the GAM as the interconnected, contemporaneous internal states of the individual, such as aggression-related cognitions, negative affect such as anger, and heightened arousal states which can be misinterpreted as anger. The content of these three routes is thought to be highly connected, cognitions, emotions, and arousal all influence one another. These routes are also thought to influence the appraisal of the situation and therefore the decision making process. There is likely to be bias in the individual's information processing towards information that confirms the individual's prior beliefs. In particular, cognitions can influence the interpretation of the situation as hostile and activate aggressive scripts. Therefore, cognitions play an important role in this model.

Theories of PTSD and Aggression

As previously discussed, PTSD can affect the way individuals perceive, process and respond to situations (Collins & Bailey, 1990). An individual's schemata about the world may be challenged by the experience of trauma which is incompatible with these prior beliefs. These changes in perception may provide a mediating psychological process between PTSD and violent behaviour, given the role of cognitions in theories of violence. The US National Center for PTSD provides an analysis of PTSD and criminal behaviour (United States Department of Veteran Affairs, 2010). They describe changes in cognitions for individuals

with PTSD, such as the individual's view of the world being one of mistrust and threat, the development of beliefs around vigilantism and retribution, and extreme beliefs around justice and disregard for authority, alongside re-experiencing symptoms. These beliefs could lead an individual to more readily interpret others' intentions as hostile and increase their use of aggressive responding. This idea is supported by information processing theories of PTSD.

Information processing theories of PTSD suggest individuals with PTSD are more likely to perceive threat in their environment due to cognitive biases towards interpretation of threat triggering a 'survival mode' (Chemtob, Roitblatt, Hamada, Carlson, & Twentyman, 1988), with increased levels of arousal (Pitman, Orr, Forgue, de Jong, & Claiborn, 1987). This hyper-arousal can occupy resources of executive functioning which reduces the capacity for appraisal of situations (Dalgleish, 1999). An interpretation of threat alongside a limited appraisal of the situation and high arousal levels could lead to impulsive aggressive responding.

Another characteristic of PTSD that could increase potential for aggression is anger. Much research has looked into the role of anger in PTSD (Chemtob, Hamada, Roitblat, & Muraoka, 1994; Jakupcak & Tull, 2005; Novaco & Chemtob, 2002; Taft, Street, Marshall, Dowdall, & Riggs, 2007). Research has demonstrated the relationship between PTSD and anger in civilian populations. Jakupcak and Tull (2005) found civilian men who had been exposed to a traumatic event and had reported some PTSD symptoms indicated more internalised anger, more trait anger, more hostility, and more aggression and violence than those who did not report PTSD symptoms. Orth and Wieland (2006) conducted a meta-analysis into the association between anger, PTSD, and hostility using 39 studies. They found significant relationships between anger, hostility and PTSD, particularly among military samples. More specifically, they found a significant relationship between PTSD and measures of anger expression 'in', which they describe as inhibition and non-disclosure of anger, and anger rumination.

The role of anger in PTSD can be considered alongside the previously mentioned cognitive processing model. In Novaco's (1994) model of anger, anger is a product of cognitive processing of a situation, alongside physiological arousal, and behavioural reactions. This theory was integrated with the information processing theory of PTSD proposed by Chemtob, et al. (1988) in a paper by Chemtob, Novaco, Hamada, Gross, and Smith (1997). They

emphasise the interrelated nature of emotions, cognitions and behaviours, and that PTSD can have a dysregulatory impact on anger. The activation and duration of anger is seen as related to the perception and processing of information. The information processing theory of PTSD proposes individuals suffering from PTSD are more likely to perceive situations as threatening, which activates a biologically predisposed 'survival mode'. This survival mode is characterised by 'fight or flight' reactions and biases in cognitions. There is an expectation of, and increased sensitivity, to, threat, leading to a hostile attribution bias and activation of this 'survival mode'. This impacts the information processing of the individual in order to address this threat, which may lead to selective attention to confirmatory information, difficulty in regulating arousal, and more urgent, unregulated responses. The cognitive labelling applied to feelings of arousal may lead to the heightened arousal levels in PTSD being interpreted as anger. Where cognitions may normally be used to manage arousal levels, an individual with PTSD may lack available cognitive resources as they are otherwise preoccupied with the perceived threat. Finally, anger can increase the accessibility of aggressive response scripts previously associated with anger states. The activation of 'survival mode' may occur inappropriately in individuals with PTSD due to cues in the environment that are associated with the trauma threat, and information processing confirmatory bias as well as increased arousal may reinforce it. This theory implicates the individual's cognitive appraisal of situations as threatening in the development of anger and arousal, as well as in dysregulation of responses. Therefore, it may be important to investigate those cognitions in PTSD that may lead to anger and the potential for violence.

Aims

The aim of this thesis is to explore the factors that mediate the relationship between PTSD and violence.

Objectives

In meeting the aim of this thesis the following objectives were set:

- To consider the risk factors for violent behaviour in PTSD
- To consider the psychological processes that may mediate the relationship between PTSD and violence
- To consider the role of violent cognitions in PTSD and violence
- To explore the measurement of violent cognitions

- To inform the effective treatment of individuals with PTSD

Overview

In order to identify factors which mediate PTSD and violence in military populations, a systematic review of the previous literature is presented in Chapter Two. This provides an aggregated description of the mediators identified by other researchers. However, these factors fail to explain the relevant psychological processes involved. In attempting to explore the mediating psychological processes between PTSD and violent behaviour, the role of cognitions is explored. Despite the importance placed on cognitions in information processing models of aggression and in the treatment of violent behaviour, few psychometric assessments of these cognitions exist. Many scales exist which measure cognitions, beliefs and distortions that have been found to be important in sex offending (e.g., Abel et al., 1989; Burt, 1980; Bumby, 1996), but few comparable measures exist for violence (Walker, 2005). Chapter Three aims to identify such an assessment and considers the properties of the Firestone Assessment of Violent Thoughts (FAVT), developed in 2008 by Firestone and Firestone. Chapter Four aims to use identified assessments to explore cognitions associated with violence in a military sample of individuals with and without PTSD. Finally, a discussion of the findings is contextualised within previous literature, and future considerations are proposed.

Chapter Two

Combat-related Post-Traumatic Stress Disorder and Violence in Military Personnel

A Systematic Literature Review

Abstract

The purpose of the review was to explore the relationship between PTSD and violence in military personnel and veterans, and to consider the potential mediators of this relationship. A systematic method was used to search the available literature and 16 studies were selected following the application of inclusion and exclusion criteria and quality assessment. All studies found a relationship between PTSD and violence. The results of these studies were drawn together qualitatively in an attempt to build a picture of the variables associated with PTSD and violence which included demographics, combat exposure, in-patient status, co-morbid disorders, affective states, relationship problems, and substance misuse. Some of these factors exist prior to, and independent of, trauma, and may be found in the general population. However, others represent a unique pathway to violence for veterans with PTSD. There are methodological difficulties in research in this area and the generalisability of results is considered as well as implications for future research and risk assessment.

Background

There has been recent concern regarding military personnel finding themselves involved in the criminal justice system. Studies suggest the most commonly occurring offences relate to violence, particularly intimate partner violence (NAPO, 2009). The incidence of domestic violence in the US is identified as higher in military than in civilian families (Cronin, 1995). PTSD is one potential characteristic that could be prevalent in the military personnel/veteran population which has been linked to the perpetration of violence. The National Vietnam Veterans Readjustment Study (NVVRS; Kulka, 1990) found that veterans with a diagnosis of PTSD perpetrated an average of 13 acts of violence in the preceding year compared with the veterans without a diagnosis of PTSD who reported an average of three acts of violence in the preceding year. Research has also indicated that PTSD is associated with violent behaviour in the civilian population (Collins & Bailey, 1990; Jakupcak & Tull, 2005; Parrott, Drobes, Saladin, Coffey, & Dansky, 2003).

The potential risk factors for violence in the civilian population are also likely to apply to the military personnel/veteran population. For example, there is a well documented link between substance use and perpetration of violence in the civilian population (Parrott et al., 2003). Alcohol misuse is found to be high in military populations (Fear et al., 2007) and has been linked to PTSD (Tarrier & Sommerfield, 2003). A review of literature relating to intimate partner violence (IPV) in military populations was conducted by Marshall, Panuzio and Taft (2005). They considered the prevalence of IPV, the consequences, any correlates, and treatment. They included study samples of both currently serving and veteran military personnel. The prevalence of IPV in the samples ranged from 13.5% to 58%. For both currently serving military personnel and veterans, the consequences included significant victim injury and negative outcomes for children. Correlates of IPV included problematic substance misuse, depression, and antisocial personality characteristics. For the veteran group, PTSD largely accounted for the relationship between level of combat exposure and IPV perpetration. Additional correlates included military service factors, relationship adjustment, childhood trauma, and demographic factors.

There are many other potential risk factors which may be linked to PTSD that require exploration. There may be numerous factors that mediate the relationship between PTSD and violence and it is possible that a particular combination of these may exist for military

personnel/veterans. What is pertinent however, is whether these risk factors existed for the individual prior to traumatic experiences, or whether risk has developed as a result of their traumatic experiences. This highlights the relevance of static versus dynamic factors in predicting risk. In considering the impact that dynamic factors, such as active PTSD symptoms, have on risk, the prior static risk factors must be accounted for. These may be similar to those static risk factors found in the civilian population, such as substance misuse and personality disorder. It must also be considered whether the individual has a history of violence prior to their military service. Military service may have been providing dynamic protective factors against the risk of violence for some individuals, through employment and other social factors such as social support, which are no longer present when an individual leaves the service.

It is not clear how far research from civilian populations can be applied to military populations, as well as the reverse. This will relate to the question of whether there is a unique pathway to violence for military personnel/veterans. However, if research can be generalised there are clear benefits from research with military populations where trauma is clearly identifiable, when looking at trauma in other populations. However, there are problems with the existing literature which have been identified below.

Literature

Much of the research regarding PTSD and violence in military populations has not been clear as to whether participants are currently serving personnel, or whether they are ex-serving veterans, and whether they have been medically discharged. This may be important when generalising the results of research as there is some evidence that currently serving personnel are less likely to be violent than veterans (Howard League, 2011). Due to the current serving/veteran status of the participants being unclear in much of the research, both have been included in this review, although it is noted there may be differences between the groups.

In looking at the association between PTSD and violence there are methodological difficulties due to mediating and confounding variables. The risk of violence may have existed prior to the development of PTSD and may relate to other risk factors. Secondly the impact of PTSD on risk of violence may be contingent upon other variables. Finally, a causal link cannot be confirmed on the basis of the research designed thus far which has been cross-

sectional in design therefore has not accounted for pre-existing risk factors. There are numerous variables that act as risk factors for violence and these must also be accounted for when considering the impact the experience of trauma may have had on risk of violent offending. Alongside this, there may also be protective factors that may have ceased to be effective. There is a complex picture building in the literature as to what mediates the relationship between PTSD and violence, and numerous possible confounding variables. This picture requires clarification in order to identify how PTSD impacts risk of violence and what mediates this relationship.

Aims and Objectives

The aim of this systematic literature review is to determine if there is a relationship between PTSD and the perpetration of violence in military personnel and veterans, and what mediates this relationship.

The objectives are:

- To consider if military personnel/veterans who suffer from PTSD are more likely to perpetrate violence
- To consider if there are factors that mediate PTSD and the perpetration of violence in military personnel/veterans

Hypotheses:

- The presence of combat related PTSD will be related to increased levels of violence in military personnel/veterans
- There will be variables that mediate this relationship

Inclusion Criteria

The Population, Exposure and Outcome (PEO) for this review:

- Population – Military personnel, including retired veterans, aged over 18
- Exposure – the presence of PTSD following combat experience
- Outcome – the perpetration of violence

Methods

Sources of Literature

Electronic sources. Searches for relevant research articles were conducted through the University of Birmingham online journal search facility. This included the following online resources: PsycInfo (1806 to date), Embase (1980 to date) and Medline (1950 to date), as well as the Cochrane online review library. The different time spans used were the broadest available for each resource.

The search terms used for these resources were:

'Military Personnel' (exploded) OR 'Military Veterans' (exploded)

AND

'Post-Traumatic Stress Disorder' (exploded)

AND

'Violence' (exploded)

These searches were also then limited to 'human' and 'adults'. The search syntax can be found in Appendix A. The remaining articles were filtered for relevance by title and abstract.

Other sources. All reference lists from identified reviews and articles were searched for relevant article titles using the same search terms. The abstracts of the references were then checked for relevance.

Finally, psychologists at the organisation Combat Stress were contacted on 21st February 2010 for any suggested relevant articles. These articles were then sourced using the online journal access of the University of Birmingham, as well as internet searches.

Study selection

Inclusion and Exclusion Criteria were then applied to these articles in order to ensure the PEO conditions were met and comparison between the studies would be possible. Only

published studies were included due to problems accessing unpublished research. The criteria applied are shown in Table 1.

Table 1

Study Inclusion and Exclusion Criteria

	Inclusion	Exclusion
Population	Adults (male or female) Veteran or currently serving any recognised Government (no countries excluded) Employed or previously employed in any military service (Army, Navy, Marines, Air Force, National Guard and Reservists) Combat experience as part of military service in any combat zone (such as Iraq, Afghanistan, Vietnam, Balkans, WWII, Falklands)	Militia Groups Military personnel/veterans without combat experience
Intervention - PTSD	Combat related PTSD Clinical diagnosis of PTSD	PTSD from civilian trauma
Outcomes	Violent behaviour that is contrary to UK law, this includes physical assault, threats of violence, property damage (when enraged), indirect violence, weapon use The violent behaviour is examined in military personnel/veterans Violent behaviour that occurs in any context other than active	Behaviour that does not have the potential to cause fear of harm in others or harm to others Violent behaviour perpetrated by those associated with the military personnel/veteran, such as family members, partner, children, parents Violent behaviour that occurs whilst on active duty, even if it contravenes the Geneva

	Inclusion	Exclusion
	duty Violence that is directed towards another person (child or adult) or has the potential to cause physical or psychological harm or fear of harm to another person (child or adult)	convention Violence directed towards the self
Study Design	Any published empirical study Includes cohort studies, case-control, cross-sectional, and case studies.	Reviews Opinion papers Commentaries Editorials Unpublished papers

Quality Assessment

The included studies have all been peer reviewed as they have been published. Alongside this, a quality assessment was undertaken in order to select research that gives the most comparable, empirically valid and reliable results. Data relating to the sampling, controls, measures, attrition rate, analysis, and limitations were entered into a table for quality assessment. Where the table states 'not detailed' this indicates the data is missing as the information was not decipherable, or not included in the article write up. Ideally this would be followed up with the researcher, however problems obtaining contact details and time constraints did not allow for this. A quality assessment criteria form was developed and is available in Appendix B. The research articles selected were subjected to quality scoring based on the criteria outlined in the form. The research articles that achieved a score of seven or more out of a maximum of 20 were included in data synthesis. This cut off score is arbitrary and was determined based on excluding any research that fell below the quality of the majority of studies. There were several limitations that applied to the majority of studies which included the possibility of unaccounted for variables, bias in self-report, and analyses that do not infer causality. Therefore, no studies were discounted based on these limitations alone. Ideally this quality assessment would also be scored by a second rater to ensure reliability, however this was not possible due to time constraints.

Results

The search results and process of exclusion of studies is described and then represented in a diagram.

The initial number of hits from electronic sources, professional sources, and reference lists was *n* = 183.

From searches in electronic sources the following results were found:

Databases – PsycInfo – no of hits – 87, 1806 – 23/02/10
Embase – no of hits –119, 1980 – 23/02/10
Medline – no of hits – 53, 1950 – 23/02/10

Gateways – Cochrane – no of hits – 0, 1898 – 23/02/10

Having applied the limitations of 'human' and 'adult' to these search results the following results remained:

Databases – PsycInfo – no of hits – 72, 1806 – 23/02/10
Embase – no of hits – 67, 1980 – 23/02/10
Medline – no of hits – 34, 1950 – 23/02/10

The titles and abstracts of these articles were examined for relevance based on the PEO search terms.

This reduced the number of articles to:

Databases – PsycInfo – no of hits – 15, 1806 – 23/02/10
Embase – no of hits – 5, 1980 – 23/02/10
Medline – no of hits – 2, 1950 – 23/02/10

A request for articles from Combat Stress resulted in six articles. The titles of these articles were filtered for relevance using the PEO which resulted in four articles.

Searching reference lists produced four further articles.

Overall 30 articles were found through the sources detailed. However, nine of the articles found were duplicated in searches from more than one source; therefore the total number of unique articles was 21. Two of these were unpublished dissertations which were not included due to difficulty accessing them. This may have introduced a publication bias into the review. These articles were subjected to the inclusion/exclusion criteria which resulted in two articles being excluded. See Appendix C for details of excluded articles. The 17 remaining articles were subjected to quality assessment and study 12 was discounted based on quality assessment scores below seven. The total number of studies included in the review was 16. The final 16 studies to be included in the review were arrived at through systematic searching and the imposition of criteria and quality assessment. The following diagram details the procedure and number of studies found:

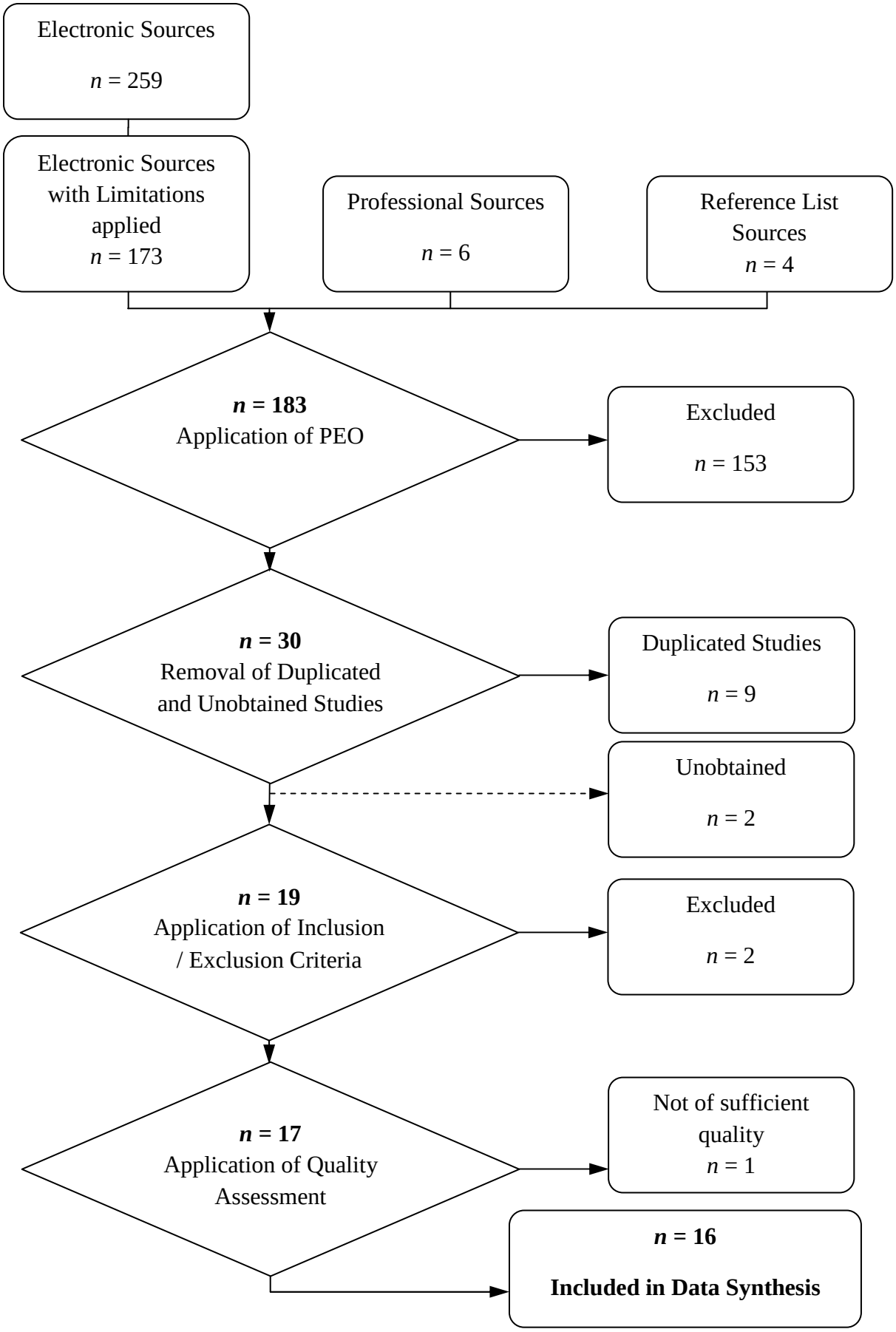

Figure 1: Procedure for Systematic Literature Review

Data Extraction

Having identified those studies that will be subjected to data synthesis, the relevant information was extracted. This included information related to:

- The hypotheses
- The variables
- The comparison groups (if applicable)
- The analysis
- The results and conclusions

Characteristics of Included Studies

Table 2 details the information gleaned from the studies through data extraction:

Table 2

Characteristics of Included Studies

Study # Authors (Year)	**Aim**	**Variables**	**Comparison Group**	**Results**	**Conclusion**
Study 1 Beckham, J. C., et al. (1998)	To explore the relationship between atrocities exposure and PTSD symptoms, guilt and intimate partner violence (IPV) in veterans.	**IV:** Atrocities Exposure, combat exposure, age, guilt, and PTSD symptoms. **DV:** Inter-personal violence.	None detailed.	In correlational analyses, atrocities exposure was moderately related to all measures except the Trauma-Related Guilt Inventory (TRGI) lack of justification subscale, as was violence. In the regression model, atrocities exposure was significantly related to overall PTSD symptom severity, re-experiencing symptoms, overall guilt, guilt cognitions and the subscales of hindsight-bias, responsibility and wrongdoing. Younger age was significantly related to increased scores on the PTSD measure, guilt cognitions, wrongdoing and interpersonal violence. Combat exposure was significantly related to interpersonal violence.	Both atrocities exposure and combat exposure were related to many measures of PTSD symptom severity. PTSD symptoms also were related to violence. Atrocities exposure was not associated with current interpersonal violence. Combat exposure has an independent effect on interpersonal violence.
Study 2 Beckham, J. C., et al. (1997)	**Study 2.1** To explore whether there is increased interpersonal violence in combat veterans with PTSD, and whether family reports of violence are consistent with veteran reports.	**Study 2.1** **IV:** PTSD, combat exposure. **DV:** Familial violence.	**Study 2.1** Combat veterans without PTSD.	**Study 2.1** In a logistic regression analysis, there was a significant main effect of combat exposure (p = 0.04) and PTSD (p = 0.002) on levels of violence. t-tests showed higher reports of family violence for PTSD patients than non-PTSD participants (p = 0.04).	**Study 2.1** Combat veterans with PTSD and their family members reported the veterans displayed higher levels of interpersonal violence in the past year compared to controls. Individuals with greater combat exposure reported higher levels of violence.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
	Study 2.2 To identify possible demographic and psychological variables associated with interpersonal violence in veterans with PTSD.	**Study 2.2** **IV:** demographics, hostility scales, alcohol misuse, childhood abuse, level of PTSD, combat exposure. **DV:** Interpersonal violence.	**Study 2.2** None detailed.	**Study 2.2** Age significantly correlated with combat exposure (-0.34) and PTSD severity (-0.28). Lower socio-economic group significantly correlated with inter-personal violence (0.01). Combat exposure correlated with PTSD severity (0.38). PTSD severity correlated with hostile affect (0.48), cynicism (0.32) and aggressive responding (0.33). Hostile affect correlated with cynicism (0.46), and aggressive responding (0.50). Cynicism correlated with aggressive responding (0.42). Alcohol misuse and childhood physical abuse were unrelated to any other variables. Logistic regression analysis with the outcome of interpersonal violence found lower socio-economic group, higher aggressive responding, and greater PTSD severity were significant predictors (in that order).	**Study 2.2** Interpersonal violence was significantly related to lower socio-economic status, antagonistic behavioural responding, and current PTSD severity. . Level of combat exposure had an independent effect on interpersonal violence. Current alcohol problems and childhood physical abuse experiences were unrelated to interpersonal violence.
Study 3 Begić, D., & Jokić-Begić, N. (2001)	To measure aggressive behaviours in the presence and absence of PTSD in veterans in Croatia.	**IV:** PTSD, history of aggression, history of maltreatment, age, education, marital status, socio-economic status	Individuals with psychiatric disorder (not PTSD,psychosis or traumatic brain injury).	No differences between the groups on the basis of demographic or socio-economic status. 26.6% of the PTSD group had previously been mistreated compared to 10.8% in the comparison group.	Veterans exposed to prior mistreatment are more likely to develop PTSD. Violent behaviour is more prevalent in combat veterans with PTSD (both auto and hetero aggression).

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
		DV: Auto-aggression (suicide); hetero-aggression (verbal aggression, physical aggression, sexual aggression, aggression in traffic and use of weapons), time period of onset of aggressive behaviour.		16.5% of the PTSD group and 13.5% of the comparison group had a history of violence. Alcohol problems were present in 40% of the PTSD group and 29.7% of the comparison group. For 6 veterans (7%) their violent behaviour followed the war event, for 22 veterans (25.3%) their violent behaviour occurred within 12 months of the war event, and for 58 veterans (67.4%) their violent behaviour occurred more than 12 months after the war event. Auto-aggression – 13 with PTSD (17%) and 2 without PTSD (18%) - 3 with PTSD - self-mutilation - 5 with PTSD – suicidal thoughts - 5 with PTSD – tried to commit suicide - 2 without PTSD – suicidal thoughts Hetero-aggression – 47 with PTSD (63%) and 8 without PTSD (73%) - Verbal aggression – 36 with PTSD and 3 without - Physical aggression (inc to objects) – 22 with PTSD and 3 without - Sexual aggression – 1 with PTSD and 1 without - Aggression in traffic – 15 with PTSD - Use of weapons – 4 with PTSD - Of 20 patients showing physical aggression 12 (60%) were under influence of alcohol	Combat veterans with PTSD act aggressively more frequently.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				Combined aggression types – 15 (20%) with PTSD and 1 without (3%). The mean number of violent acts during the past during the past 12 months for PTSD veterans was 18.2, and for the comparison group was 2.7.	
Study 4 Byrne, C. A., & Riggs, D. S. (1996)	To explore the relationship between PTSD symptomology and three forms of relationship aggression (physical, verbal and psychological), which was predicted to be at least partially be explained by relationship conflict.	**IV:** PTSD symptoms, level of combat exposure, relationship problems. **DV:** Verbal, Physical and Psychological aggression as reported by male veteran and female partner.	None detailed.	Veterans' PTSD symptoms were directly related to their reports of physical violence, and verbal and psychological abuse of their partners. As veterans' PTSD symptoms increased, their partners reported increased levels of verbal and psychological abuse. Female partners' reports of physical abuse were not significantly related to veterans' PTSD symptoms. Relationship problems were correlated with aggressive behaviour. PTSD symptoms were a significant predictor of both veterans' and partners' reports of relationship aggression. In a mediation analysis, relationship problems were found to significantly account for the positive association between veterans' PTSD symptomology and their use of aggression. Veterans' self-reported level of combat exposure was significantly correlated with veterans' PTSD symptoms and use of verbal	Veterans with increased PTSD symptomology reported greater levels of physically violent behaviour , also higher levels of PTSD were associated with more frequent and severe use of verbally and psychologically abusive behaviour. The association between PTSD and relationship aggression was accounted for by level of combat exposure. There was no support for a relationship between PTSD symptoms and women's reports of physical victimisation. Relationship conflict or problems were found to be one mechanism through which PTSD exerts an influence on veterans' use of aggression.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				aggression. In a regression analysis, combat exposure did not predict relationship aggression.	
Study 5 Freeman, T. S., et al. (2003)	To compare three groups of veterans (schizophrenics, PTSD group and alcoholics) with similar histories of alcohol and substance use on psychological measures, demographic information and self-reported gun use and collection of weapons.	**IV:** Demographics, PTSD, Schizophrenia, Substance Use, Alcohol Use. **DV:** Gun ownership, Risk behaviour with firearm (aiming, firing, carrying, animal killing whilst enraged, considering suicide, hiding weapon at home), family views of firearms as an issue, aggression, hostility.	Individuals with Schizophrenia or in substance use rehabilitation.	There were no differences between the groups on substance misuse measures. The Schizophrenic group scored significantly higher than the substance abuse group on both the Aggression Questionnaire (p = 0.026) and the Hostility Scale (p = 0.008). The PTSD group scored higher than the Schizophrenic group on the Aggression Questionnaire (p =< 0.001) and the Hostility Scale (p = 0.002). The PTSD group reported owning more firearms, both currently and in the past, and a higher frequency of weapon-related activities (aiming and firing weapons at others, considering suicide with firearms, patrolling their property with loaded weapons, carrying a gun on their person, killing or mutilating animals while enraged, and hiding weapons in their homes) than schizophrenic subjects or substance abusing subjects. PTSD patients also more frequently related feeling at risk from their own guns than the other psychiatric groups. The PTSD group also more often reported that their families had asked them to get rid of their firearms.	The PTSD group scored significantly higher on the Aggression Questionnaire and Hostility Scale than the other two groups. PTSD patients owned 4x as many firearms as others and reported significantly higher levels of potentially dangerous firearm related behaviours than other psychiatric patients. The three groups differed significantly on weapon collection and use, even when substance use was the same in all groups.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
Study 6 Jakupcak, M., et al. (2007)	To evaluate the relationship between anger, hostility, and aggression and PTSD symptomology.	**IV:** Combat exposure, PTSD severity, problem drinking, age. **DV:** Aggression (including destroying property, threats, and physical violence in last 4 months), trait anger, hostility.	PTSD sub-threshold group. Non-PTSD group.	PTSD and sub-threshold group – 50% reported at least one act of aggression in the last 4 months compared to 20% in the non-PTSD group. Age was significantly negatively associated with aggression but not anger or hostility. No other demographics were significant. Combat exposure was significantly positively associated with trait anger (p =< 0.05), hostility (p =< 0.05) but was not significantly related to aggression. Problem drinking was significantly positively associated with trait anger (p =< 0.01), hostility (p =< 0.01), and aggression (p =< 0.05). After accounting for combat exposure and problem drinking, the PTSD group reported significantly greater trait anger than both the sub-threshold PTSD group (p =< 0.01) and the non-PTSD group (p =< 0.01). The sub-threshold group reported significantly greater trait anger than the non-PTSD group (p =< 0.01). After accounting for combat exposure and problem drinking, the PTSD group reported significantly greater hostility than both other groups (p =< 0.01). The sub-threshold group reported significantly greater hostility than the non-PTSD group (p =< 0.01).	Veterans who scored positively for PTSD reported greater trait anger and hostility and were more likely to endorse recent aggression than non-PTSD group. Veterans reporting sub-threshold levels of PTSD indicated greater levels of trait anger and hostility than the non-PTSD group and were more likely to report aggression than the non-PTSD group. Although the PTSD group reported higher levels of hostility and trait anger than the sub-threshold group, they did not report more aggression.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				In a logistic regression, there was a significant main effect of PTSD on aggression when controlling for age and problem drinking. The PTSD group were more likely than the non-PTSD group to report aggression. The sub-threshold group were more likely than the non-PTSD group to report aggression. There was no significant difference in aggression between the PTSD and sub-threshold group.	
Study 7 McFall, M., et al. (1999)	To compare a PTSD inpatient group, psychiatric inpatient group, and community PTSD group of Vietnam veterans on levels of violence. To identify correlates of violence within PTSD in-patients.	**IV:** PTSD, avoidance, re-experiencing, arousal, inpatient treatment, combat exposure, atrocities exposure, functioning, demographics (inc age, marital status, race, previous jail term, education), psychopathology (inc depression), substance use. **DV:** Violence (inc threats, weapons, property damage, physical).	PTSD community sample (never treated as inpatient) from NVVRS. Non-PTSD psychiatric in-patient sample.	PTSD in-patients endorsed significantly more items on all the violence measures ($p < 0.001$), and were significantly more likely to have engaged in one or more acts of violence in the last 4 months than psychiatric in-patients without PTSD ($p < 0.001$). Significantly more PTSD in-patients endorsed at least 3 of these types of violence than other inpatients ($p < 0.01$). PTSD in-patients reported significantly more problems controlling violence in the 30 days prior to hospitalisation ($p < 0.001$) than psychiatric inpatient controls. Significantly more PTSD in-patients reported threats of violence ($p =< 0.01$), physical violence ($p =< 0.001$) and threats with a weapon ($p =< 0.001$) than the NVVRS community PTSD sample. However, the NVVRS community sample were significantly more likely than PTSD in-patients to destroy property ($p = 0.01$).	PTSD in-patients report more interpersonal violence than psychiatric in-patients with other diagnoses, and are more severely violent despite their equivalent functioning and distress. Comparisons between PTSD in-patients and NVVRS community PTSD subjects revealed greater self-reported violence for PTSD in-patients than the community sample. They were also more likely to report severe violence, although community samples report more property damage. Demographics, functioning, and treatment involvement variables did not impact violence. PTSD explained the most significant amount of variance of violence in PTSD inpatients, even when controlling for combat exposure, substance use and

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				PTSD in-patients were significantly more violent than the NVVRS community sample ($p < 0.01$) and were 2x as likely to have endorsed 3 or more types of violence ($p < 0.001$). In a multiple regression analysis, atrocities exposure ($p < 0.05$), and substance use ($p < 0.01$) were significant, no significant effects were found for depression. PTSD accounted for the greatest amount of variance (54%, $p < 0.001$), even when accounting for combat exposure (ns) and co-morbid psychopathology (ns). The avoidance numbing cluster was most strongly related to violence ($p < 0.001$), followed by arousal ($p < 0.01$); re-experiencing was not significant.	depression. Co-morbidity did not account for violence in the in-patient PTSD group. Combat and atrocities exposure does not account for violence independent of PTSD.
Study 8 Orcutt, H. K., et al. (2003)	To explore the relationship between dysfunction in family of origin, poor parental relationships, childhood anti-social behaviour (ASB), combat exposure and intimate partner violence (IPV) in veterans with PTSD. (Data taken from NVVRS.)	**IV:** Family dysfunction, family turmoil, severe punishment, inter-parental violence, early trauma, relationship with mother, relationship with father, childhood ASB, combat exposure, perceived threat, PTSD. **DV:** Intimate partner violence.	None detailed.	Using structural equation modelling, the final model had 4 direct paths to intimate partner violence: poor relationship with mother, combat experiences (negative), perceived threat in the war zone, and PTSD symptom severity. Family dysfunction was directly related to childhood ASB; and PTSD. Family dysfunction was only indirectly linked to IPV through PTSD; or childhood ASB, and then combat exposure or perceived threat. Childhood ASB was directly associated with combat exposure and perceived threat and indirectly associated with IPV through these two factors.	The veteran's background increases risk of perpetrating violence. Experience of PTSD symptoms appears to increase risk for IPV. The higher the level of family dysfunction the greater the level of childhood ASB, and the greater the report of PTSD symptoms which were associated with IPV. Individuals with a history of childhood ASB were more likely to be exposed to combat and perceive threat.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				Combat exposure was directly linked to perceived threat and IPV, or indirectly to IPV through perceived threat. Poor relationship with father did not demonstrate an association.	Effects of war-zone variables on IPV were partially mediated by PTSD. Although higher levels of combat exposure were associated with less violence. Perceived threat in the war-zone was positively associated with violence. Stressful early family life, childhood anti-social behaviour, and war zone stressors were indirectly associated with IPV via PTSD.
Study 9 Sherman, M. D., et al. (2006)	To compare relationship variables and violence in couples in therapy which include veterans with PTSD, veterans with depression, and veterans with another diagnosis (comparison couples).	**IV:** PTSD, depression, demographics relationship satisfaction, intimacy satisfaction. **DV:** Physical violence, severe violence.	Depression veteran couples. Comparison veteran couples.	When looking at both veterans' reports and their partners' reports, the PTSD group were significantly more likely to perpetrate violence towards their partners than the comparison group ($p < 0.05$), perpetrated significantly more violence ($p < 0.05$), and were significantly more likely to perpetrate severe violence ($p < 0.05$). Similarly, depressed veterans were more likely to perpetrate violence than the comparison group ($p < 0.05$), perpetrated significantly more violence ($p < 0.05$), and were more likely to perpetrate severe violence ($p < 0.05$). There was no significant difference between the PTSD group and depression group in reports of violence. Younger age ($p < 0.01$) and physical health problems ($p < 0.05$) were significantly	Rates of violence in PTSD and depressed couples are more than 6x that in the normal population, and rates of severe violence 14x that of normal population. PTSD couples were no less satisfied in their marriage than comparison couples.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				associated with violence. The PTSD and depression group were significantly more likely to perpetrate violence after adjusting for the other covariates. PTSD and younger age were significantly associated with severe violence. There were no significant differences between groups in marital satisfaction or intimacy. All groups fell into the highly distressed range on the marital satisfaction scale.	
Study 10 Taft, C. T., et al. (2007a)	To examine the associations between the separate PTSD symptom clusters, physiological reactivity upon exposure to trauma cues, combat exposure, alcohol problems, and aggressive behaviour among a sample of male military veterans receiving services at the Department of Veteran Affairs.	**IV:** PTSD symptom clusters, physiological reactivity, alcohol problems, combat exposure. **DV:** Aggression.	None detailed.	The PTSD symptom clusters were highly correlated. There were medium to large correlations between both the re-experiencing symptoms and avoidance symptoms with aggression. The association between hyperarousal symptoms and aggression was large. There was a small to medium association between physiological reactivity and aggression. There was a small to medium association between alcohol problems and aggression. There were small to medium associations between PTSD clusters and physiological reactivity, and the PTSD clusters and alcohol problems. There was no relationship between alcohol and physiological reactivity.	Hyperarousal had a stronger positive association with aggression than other symptoms. Hyperarousal symptoms were associated with a greater frequency of aggression through their relationship with alcohol problems. Physiological reactivity did not mediate the effects of hyperarousal symptoms on aggression. Re-experiencing symptoms did exert indirect positive effects on aggression through their relationship with physiological reactivity. There was a significant direct negative association between avoidance and aggression in the

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				A structural equation model showed a direct positive relationship between hyperarousal symptoms and aggression, and a direct negative relationship between avoidance symptoms and aggression. There was no direct relationship between re-experiencing symptoms and aggression, although there was an indirect relationship through the other symptom types. Age had a direct negative association with aggression ($p < 0.001$). There was also an indirect association of age and aggression via a negative association with both the avoidance and the hyperarousal symptoms ($p < 0.001$). Combat exposure had an indirect relationship with aggression, via both hyperarousal, and avoidance symptoms ($p < 0.001$). When examining indirect relationships between PTSD and violence through alcohol and physiological reactivity, re-experiencing symptoms showed only an indirect association with aggression through a negative relationship with alcohol problems ($p < 0.01$), and a positive relationship with physiological reactivity ($p < 0.05$). Hyperarousal symptoms continued to show a positive direct association with aggression as well as an indirect positive relationship through alcohol ($p < 0.001$). The effects of combat exposure on aggression were entirely explained by PTSD symptom	model, but a positive relationship between avoidance and aggression at the bivariate level. Combat exposure was only indirectly related to aggression through PTSD symptoms.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				severity ($p < 0.001$) Avoidance continued to show a direct negative relationship with aggression but this was not significant (ns). The relationship between alcohol problems and physiological reactivity was non-significant.	
Study 11 Taft, C. T., et al. (2005)	To examine general risk factors for partner violence (PV) perpetration among veterans with PTSD, and to distinguish these individuals from partner violent individuals without PTSD.	**IV:** PTSD, childhood abuse, parental domestic violence, co-morbid psychiatric problems (substance abuse, depression, anti-social personality disorder), family adaptability, marital adjustment, family cohesion, combat exposure, atrocities exposure, perceived threat in the war zone. **DV:** Violence.	Non-PTSD partner violent group. PTSD non-partner violent group.	The two PTSD groups did not differ on PTSD severity; the two partner violent groups did not differ significantly on violence severity. No significant differences were found between the PTSD-PV group and the other two groups on family-of-origin variables (childhood abuse and parental domestic violence), or alcohol abuse. Depression was higher in the PTSD-PV group than in PTSD-non-PV ($p < 0.01$) group and the non-PTSD-PV ($p < 0.001$) group. Drug dependence was higher in the PTSD-PV group than in the PTSD-non-PV group ($p = 0.03$) and non-PTSD-PV group ($p = 0.02$). The prevalence of anti-social personality disorder was higher in the PTSD-PV group than in the non-PTSD-PV ($p = 0.03$) group. The PTSD-PV group reported significantly lower marital adjustment than the PTSD-non-PV group ($p < 0.01$) and the non-PTSD-PV group ($p < 0.001$) and significantly lower family adaptability than the non-PTSD-PV	The PTSD-PV group was highest on almost all the risk factors, including all of the psychiatric condition variables, relationship problem variables and war zone variables, as well as exposure to parental domestic violence. PTSD-non-PV individuals were highest on childhood abuse. Between the PTSD violent and non-violent groups, the PTSD-PV group reported significantly higher rates of depression, drug abuse, poor marital adjustment, and atrocities exposure than the non-violent PTSD group. These results suggest that trauma-related experiences, co-morbid psychopathology and relationship problems associated with PTSD are risk factors for PV. For those with PTSD who reported low marital adjustment and alcohol abuse there was a risk of PV, unless

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				group ($p = 0.02$). The differences between the groups on family cohesion did not reach significance. The PTSD-PV group reported significantly higher combat exposure ($p < 0.001$), atrocities exposure ($p < 0.001$), and perceived threat ($p < 0.001$) than the non-PTSD-PV group. The PTSD-PV group were exposed to more atrocities than the PTSD-non-PV group ($p < 0.05$), although did not differ on combat exposure or perceived threat. In a classification tree analysis, those in the PTSD groups who had marital adjustment scores of more than 3.8 had a 16.2% rate of PV. Among those with lower marital adjustment, those who did not report alcohol misuse had 7.5% rate of partner violence. Those who had used alcohol but had witnessed parental PV had a 0% rate of PV. Those who had low marital adjustment, report alcohol abuse, and did not witness parental PV had a 79.5% rate of PV.	they had witnessed parental domestic violence which was associated with a lack of PV.
Study 12 Taft, C. T., et al. (2007b)	To examine relationships between PTSD, anger, and intimate partner violence using a trauma prime.	**IV:** PTSD, trauma prime. **DV:** Physical and psychological intimate partner violence (IPV), anger, anxiety.	Vietnam veterans tested as PTSD-negative.	Repeated measures analyses showed the PTSD group evidenced higher state anger scores that the non-PTSD group across conditions and time ($p < 0.001$). Also state anger increased over time following the trauma prime in the PTSD group ($p < 0.001$). Time was not significant for the non-PTSD group or following the neutral prime. The PTSD group reported experiencing higher levels of anxiety than the non-PTSD group ($p < 0.001$). Time was significant across all groups	PTSD symptoms were associated with increased anger. The PTSD group reported higher state anger across time and neutral and trauma primed conditions, and higher anger reactivity during the trauma prime condition. The PTSD group also exhibited more anger reactivity to the trauma prime than the neutral prime. The groups did not differ in levels

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				and conditions; anxiety decreased post-manipulation ($p < 0.01$), but decreased significantly more following the neutral prime than the trauma prime. The PTSD group had higher post-trauma prime state anger than the non-PTSD group ($p < 0.05$), but the groups did not differ on post-trauma prime anxiety levels. PTSD symptoms were associated with psychological partner abuse ($p =< 0.001$), and physical partner abuse ($p =< 0.05$). Compared with the non-PTSD population, the PTSD population scored higher on physical assault and psychological assault ($p < 0.01$). PTSD symptoms were associated with trait anger, state anger, and anger reactivity during the trauma prime condition with large effect sizes. Trait anger positively associated with partner abuse, both psychological (large effect size) and physical (medium effect size). Both state anger and anger reactivity were not associated with partner abuse following the trauma prime, therefore were not included in a mediation analysis. A mediational analysis showed trait anger mediated the relationship between PTSD and physical aggression ($p < 0.05$), and between PTSD and psychological aggression ($p < 0.05$)	of anxiety following both the trauma and neutral prime. PTSD symptoms were associated with physical assault and psychological aggression and trait anger mediated this relationship. The higher the levels of PTSD symptomology the higher levels of state and trait anger, and anger reactivity following a trauma cue. Trauma cued state anger was not associated with risk of partner abuse, but more dispositional anger problems were.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
Study 13 Taft, C. T., et al. (2007c)	To test a model examining the interrelationships among combat exposure, PTSD symptoms, dysphoric symptoms, and anxiety symptoms in predicting aggressive behaviour amongst veterans.	**IV:** Anxiety, depression, combat exposure, PTSD. **DV:** Aggression	None detailed.	In bivariate analyses, PTSD, dysphoric symptoms and anxiety were significantly associated with aggression in the medium range ($p < 0.05$). Combat exposure was not significantly associated with aggression. In the model, there were direct effects of combat exposure on PTSD, of PTSD symptoms on dysphoric and anxiety symptoms, and of PTSD on aggression. There were also direct effects of dysphoric symptoms on aggression. Combat exposure and anxiety did not show a significant association with aggression in the model. There was a significant indirect association between PTSD and aggression through dysphoric symptoms, and from combat exposure to aggression through PTSD, and through PTSD plus dysphoric symptoms. A mediation analysis showed dysphoric symptoms mediated the relationship between PTSD and aggression, and PTSD mediated the relationship between combat exposure and aggression.	PTSD symptoms are directly associated with aggression. Dysphoric symptoms partially account for the effect of PTSD on aggression. Combat exposure was not directly associated with aggression, but indirectly through PTSD. Anxiety was not associated with aggression when considered with other variables.
Study 14 Taft, C. T., et al. (2009)	To examine correlates of intimate partner aggression (IPV) among veterans seeking treatment for PTSD, including combat exposure, specific PTSD symptoms, and depression.	**IV:** Combat exposure, PTSD symptoms (hyperarousal, re-experiencing, numbing, self-persecution),	None detailed.	In bivariate analyses, PTSD and depression evidenced significant associations with partner and non-partner general and psychological aggression in the small to medium range ($p < 0.05$ - < 0.01).	Combat exposure was only significantly associated with general psychological aggression among partnered veterans. PTSD symptoms of hyperarousal were the strongest predictor of

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
		depression. **DV:** Aggression (physical and psychological), on partners and non-partners.		Arousal symptoms showed strongest association with all types of aggression with effects sizes in the medium to large range other than a small effect size with physical partner aggression. Re-experiencing symptoms were significantly associated with aggression with mostly small to medium effect sizes, except psychological aggression, which was not associated. Numbing symptoms significantly associated with psychological partner aggression and psychological general aggression. Self-persecution symptoms associated with physical aggression in both groups and with psychological aggression with non-partnered veterans. Combat exposure evidenced a small, significant positive association with general psychological aggression among partnered veterans. In a regression analyses, when accounting for depression, re-experiencing symptoms and arousal symptoms, only re-experiencing remained significant in predicting partner physical aggression, although the model was not significant. When predicting general physical aggression among partnered veterans, only arousal symptoms remained significant.	aggression. Depression symptoms did not evidence any association with aggression.

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
				When predicting partner psychological aggression, depression, numbing and arousal were considered; only arousal remained significant. When predicting general psychological aggression, depression, combat exposure and the 3 PTSD sub-scales were considered; only arousal remained significant. When predicting general physical aggression among veterans without partners, depression, 3 PTSD sub-scales and self-persecution were considered; none of the variables were significant. When considering general psychological aggression among veterans without partners, depression, 3 PTSD sub-scales and self-persecution were considered; only arousal remained significant.	
Study 15 Teten, A. L., et al. (2010)	To examine differences within the Iraq and Afghanistan veterans with and without PTSD and on a number of military and clinical variables and demographics to understand how intimate partner violence and co-morbid disorders may be represented. To examine differences for veterans with PTSD from Iraq and Afghanistan compared to Vietnam veterans in relation to	**IV:** PTSD, military variables (theatre, number of deployments, service, time served), demographics (ethnicity, marital status, children, employment status), clinical variables (depression, substance misuse).	Vietnam veterans with PTSD vs. Iraq/Afghanistan veterans with PTSD. Iraq/Afghanisan veterans with PTSD vs. without PTSD.	There were no differences between the groups on substance misuse or depression diagnosis. There were no group differences in reports of aggression between Iraq / Afghanistan veterans with PTSD and Vietnam veterans with PTSD. Iraq / Afghanistan veterans with PTSD reported significantly more psychological aggression towards a partner compared to Iraq / Afghanistan vets without PTSD ($p = 0.03$). Iraq/Afghanistan veterans with PTSD were significantly more likely to have suffered an	Iraq / Afghanistan veterans with PTSD were more likely to psychologically abuse partner than Iraq / Afghanistan vets without PTSD and are more likely to be injured by their partner. Reports of aggression, perpetrating and being victimised, were significantly correlated, suggesting mutually violent relationships. Combat exposure did not distinguish individuals with or

Study # Authors (Year)	Aim	Variables	Comparison Group	Results	Conclusion
	intimate partner violence and co-morbid disorders.	**DV:** Psychological aggression, physical assault and injury, mutual violence.		injury by their partner than Iraq/Afghanistan veterans without PTSD ($p = 0.04$). Iraq / Afghanistan veterans with PTSD have significantly higher scores on social desirability than Vietnam vets with PTSD ($p = 0.04$). Iraq / Afghanistan veterans with PTSD were 6 times more likely to report sustaining injury from their partner than Iraq / Afghanistan veterans without PTSD ($p < 0.05$). Combat exposure did not differ significantly between the groups.	without PTSD. The current study suggests the association in the literature between Vietnam veterans with PTSD and partner aggression may also be applicable to Iraq / Afghanistan veterans with PTSD.
Study 16 Zoričić, Z., et al. (2002)	To investigate the structure of aggressive behaviour in Croatian soldiers with combat-related PTSD.	**IV:** PTSD. **DV:** Verbal aggression, physical aggression, indirect aggression, verbal latent aggression, physical latent aggression.	None detailed.	There were statistically significant differences in the levels of verbal and physical aggression vs. indirect, verbal and physical latent aggression ($p < 0.01$). There was no statistically significant difference between the levels of verbal aggression and physical aggression, or between the levels of verbal latent aggression and physical latent aggression.	There were higher levels of verbal and physical latent aggression in soldiers suffering from combat-related PTSD. These findings differ from general population norms when all aggression patterns are found at equal levels. Results suggest a different structure of aggression in patients with PTSD, aggression being mostly cumulated at the latent, both verbal and physical level.

Summary of characteristics of studies

The included studies were mainly undertaken in the US, with two from Croatia, and included a mix of ethnic groups. They included mainly military veterans as well as some currently serving personnel with an average overall age of 45 years, where age was recorded. Only four participants were female. Participants had mainly served in Vietnam but also in Iraq (both 1991 and 2003 conflicts), Afghanistan, the Balkans, and the Second World War. Many of the studies drew their data from other, larger studies, predominantly the National Vietnam Veterans Re-adjustment Study (NVVRS) in the US.

Many of the participants had been clinically diagnosed with PTSD as a result of combat experience and were identified having sought treatment at a veteran affairs clinic. In some studies this group was compared to military veterans/personnel in treatment who had other diagnoses, such as substance misuse and psychosis, as well as other military veterans/personnel without a diagnosis. These comparison groups were often recruited through advertising or having been screened for PTSD. Comparisons were made for differences in the levels of violence perpetrated by the military veterans/personnel, which for most studies looked at reports of intimate partner violence. The violent behaviours examined included physical violence, verbal threats of violence, property damage, psychological aggression and threats with weapons. In those individuals who were identified as perpetrating violence, other correlates and mediators were investigated.

Those variables that were investigated were often similar. They included level of combat exposure, relationship difficulties, symptom severity, co-morbid disorders, family of origin dysfunction, substance misuse, anger, hostility and the three PTSD symptom clusters; hyper-arousal, re-experiencing and avoidance. Demographics were also often included as variables examined.

Most of the studies were case-control, cohort, or cross-sectional in design. The case control studies compare a PTSD group and control group and look for differences between the groups. Cohort studies examine a group who have been exposed to trauma and look for PTSD and other consequences. Cross-sectional studies examine a sample with PTSD at a particular point in time. Therefore, all the studies were retrospective and could not determine direction of causality. Many of the studies used the same measures (self-report

psychometrics), taking a correlational and regression approach to analysis. There were some researchers who also developed structural equation models.

A database was developed which compared all participant characteristics, methods of analysis, measures used, and variables tested in order to facilitate the comparison of studies. This database enabled the filtering of study content in order to identify comparable results for data synthesis.

Quality of Included Studies

Table 3 lists the final articles and their quality assessment information and score:

Table 3

Quality Assessment of Included Studies

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
Study 1 Beckham, J. C., et al. (1998)	*n* = 151 Vietnam combat veterans, with chronic PTSD, help-seeking at an outpatient PTSD clinic. Age – 50, 52% European-American, 48% minority (93% African-American), education – 13yrs, combat exposure – mod-heavy.	Combat exposure, age.	Atrocities exposure subscale – a subscale from the Vietnam era stress inventory, IC: 0.87 (validated). PTSD symptom severity – Mississippi scale for combat-related PTSD and the Clinician Administered PTSD Scale (CAPS), (inter-rater reliability of 0.93, validated). Davidson trauma scale – PTSD symptoms in the last week, high reliability and validity across trauma populations (validated). Trauma related guilt inventory (TRGI) – high internal consistency, adequate temporal stability, and concurrent validity (validated). However, the item development was based on a limited number of clinical interviews and clinicians who reviewed interviews for guilt characteristics. Interpersonal violence – overall violence index (OVI), subscale of the Conflict Tactics Scale	None detailed.	Multiple regression.	Correlational design means that no causal link possible. A lack of standardised measure for atrocities exposure and items that overlap with combat exposure. Other measurement limitations with TRGI and OVI. Self-report.	10

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
			(CTS). Factor analysis supports the subscale (validated).				
Study 2 Beckham, J. C., et al. (1997)	**Study 2.1** *n* = 37 Control group: 20 male combat veterans without PTSD. Non-PTSD sample recruited by mail to a random selection of 200 veterans who had sought services during the previous year. This suggests they may have suspected they had PTSD. Experimental group: 17 help-seeking, male combat veterans with PTSD. Age – 47, 65% European-American, 35% Minority (95% African-American, 5% Native American), socio-economic class – lower middle class, education -15yrs, combat exposure – moderate to heavy and moderate for non-PTSD. Both samples were signed up to a longitudinal study on hostility and physical health recruited from	**Study 2.1** No community violence. Significant effect of age, economic factors and combat exposure were controlled for. PTSD more prevalent in younger participants of lower economic status and higher combat exposure levels. Ethnicity was balanced. PTSD veterans were sig younger, of lower economic status and had higher combat exposure (mod-heavy) than non-PTSD group. PTSD group significantly more likely to be taking	**Study 2.1** Combat Exposure Scale (validated) – strong internal stability and test-retest reliability. Mississippi Scale for Combat Related PTSD (validated) – found to be reliable and valid in both treatment seeking and community samples. Must have score of 107 or more (cut-off recommended by previous studies) for PTSD group, or score of 89 or less for non-PTSD group. The Structured Clinical Interview for DSM disorders (SCID) or CAPS administered (validated) – Inter-rater reliability 0.9. Different measures used to measure PTSD. Standard Family Violence Index (validated) – completed by subject and a friend or family member. This is a subscale of the Conflicts Tactics Scale. This includes physical violence but also threats with a knife or gun. Alpha coefficient for this	**Study 2.1** 62% return rate for non-PTSD sample.	**Study 2.1** t-test. Logistic regression. Logistic regression was used instead of ANCOVA because of unequal distribution of the dependent variable across groups (ordinal DV).	**Study 2.1** PTSD sample were on anti-depressant medication (although this is more likely to reduce aggression). Small sample. Correlational. Self-report.	**S 2.1** 11

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	outpatients PTSD clinic. The control group were the consecutive participants in the larger longitudinal study. **Study 2.2** *n* = 118 Help-seeking, outpatient, combat veterans with PTSD. Age – 48, 62% European-American, 38% minority (98% African-American, 2% Native-American), socio-economic status – middle-lower, education – 15yrs, combat exposure – mod-heavy, meds – 70%.	medication. **Study 2.2** Younger age was associated with greater combat exposure and greater PTSD severity. PTSD severity was correlated with combat exposure and hostility.	subscale 0.62-0.68. **Study 2.2** PTSD measures as above: Mississippi Scale for Combat Related PTSD (validated) – found to be reliable and valid in both treatment seeking and community samples. Must have score of 107 or more (cut-off recommended by previous studies) for PTSD group, or score of 89 or less for non-PTSD group. Or the SCID or CAPS administered – Inter-rater reliability 0.9. Child Physical Punishment Subscale of the Assessing Environments (validated) – excellent test re-test reliability in distinguishing abused and non-abused adolescents – endorsement of 4 or more items. The CAGE screening questionnaire – alcohol misuse, (validated). The short form of the Cook Medley Hostility Scale	**Study 2.2** None.	**Study 2.2** Correlations Logistic regression.	**Study 2.2** The CAGE assessment identifies problematic use rather than level of use. Other factors that may potentially impact level of violence were not accounted for e.g., Criminal records. These results are only correlational and do not indicate causation and there may be mediators (pre and post-military). Self-report.	**S 2.2** 13

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
			(validated) - primarily cynicism, mistrust and antagonistic behavioural tendencies. Standard Family Violence Index (validated) – completed by subject and a friend or family member. This is a subscale of the conflicts tactics scale. This includes physical violence but also threats with a knife or gun. Alpha coefficient for this subscale 0.62-0.68.				
Study 3 Begić, D., & Jokić-Begić, N. (2001)	*n* = 116 Combat veterans in Zagreb. In psychiatric treatment since 1995 for various psychiatric disturbances. 18 hospitalised, 98 outpatients. 79 (68%) PTSD, 37 (32%) had a diagnosis of some other psychiatric disorder (anxiety, affective, and borderline personality disorder). Patients with psychosis and organic brain syndrome were excluded.	Age, education, marital status, socio-economic status, previous maltreatment, aggression prior to war experience.	Mississippi Scale for Combat-related PTSD (validated). The PTSD interview (validated).	None detailed.	Frequencies.	Self-report. Analysis not robust.	12

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	No veterans sent through courts. PTSD group (*n* = 79): age 36; employed – 40 (51%), unemployed - 20 (25%), retired – 19 (24%); mistreated – 27%; previous violence – 16.5%; problematic alcohol use – 40%. Mental disorder group (*n* = 37): age 38; employed – 22 (60%), unemployed- 7 (19%), retired – 8 (22%); mistreated – (11%); previous violence – 13.5%; problematic alcohol use – 30%. Both groups lower to lower-middle class.						
Study 4 Byrne, C. A., & Riggs, D. S. (1996)	*n* = 50 Couples of male Vietnam veterans with PTSD symptoms and female partners living together at least one year. Served active duty and exposure to combat between 05 Aug 1964 and 07 May 1975.	Combat exposure.	Combat Exposure Scale (validated) IC: 0.85, test-retest reliability: *r* = 0.97. Conflicts Tactics Scale – verbal and physical aggression (validated). PTSD Checklist Military version (PCL-M) IC: 0.97 and test-retest reliability: 0.96, correlates with Mississippi	None detailed.	Correlations. Regression.	Small self-selected sample. Correlational analysis precludes confirmation of a causal hypothesis, the causal direction may differ. Self-report.	8

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	Newspaper adverts and flyers in the Department of Veteran Affairs medical centre in a large city. Veteran's age – 49, partner's – 44; lived together 13 yrs; average number of children – 2.		Scale (validated). Psychological Maltreatment of Women Inventory (PMWI), IC:0.91-0.95 (validated). Relationship Problems Scale, IC:0.86 (not validated).				
Study 5 Freeman, T. S., et al. (2003)	*n* = 78 Patients with PTSD, schizophrenia and substance users admitted to a Veteran Affairs Hospital having served during Vietnam or since. All unemployed. 33 consecutive admissions to PTSD rehabilitation programme (27 from Vietnam-era). Age – 48. 23 patients admitted to a dual-diagnosis rehabilitation programme with a diagnosis of schizophrenia (10 Vietnam-era). Age – 44. 22 substance abusing control subjects admitted to a domiciliary programme for substance	Schizophrenic and substance abuse groups screened for PTSD and discounted. Discounted those in Schizophrenic group if too impaired to complete measures. Substance misuse group screened for psychosis using SCID. Significant difference in age of groups, PTSD group oldest.	Michigan Alcoholism Screening Test (MAST, validated). Drug Abuse Screening Test (DAST, validated). The Hostility Scale (validated). The Buss Aggression Questionnaire (validated). Weapons Survey (not validated). CAPS – PTSD (validated). SCID (validated).	Two of Schizophrenic Group refused consent. One did not complete measures.	t-test. ANOVA.	Self-report. Correlational.	12

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	abuse recovery (10 Vietnam-era). Age – 42.						
Study 6 Jakupcak, M., et al. (2007)	*n* = 117 Treatment-seeking Iraq and Afghanistan veterans presenting to a health clinic between May 2004 and June 2005. 97% Men, 3% women; 71% white; age – 33; education – 14yrs; married – 50%, single - 35% , divorced – 13%; Army/National guard – 78%, reserve status - 70%. PCL-M: PTSD cut-off 50, sub-threshold PTSD 35-49, and non-PTSD <35.	Those who had no combat exposure, *n* = 6, discounted. Age, race, education, and income.	Combat Exposure Scale (validated). Desert Storm Trauma Questionnaire (not validated). Patient History Questionnaire – problem drinking (validated). PTSD Checklist Military version (validated). State Trait Anger Expression Inventory (STAXI) Spielberger (1988) Strong reliability (validated). Brief Symptom Inventory (BSI) (validated). Aggression items (not validated).	Missing data, *n* = 6.	Correlations. t-test. ANOVA. Regression.	Reasons for seeking treatment not available. Unclear which norm group should be used. Self-report. Possible malingering due to compensation seeking. Cannot infer causality. Correlational.	14
Study 7 McFall, M., et al. (1999)	*n* = 565 Male Vietnam veterans seeking inpatient treatment for PTSD (*n* = 228); age – 46; education – 14yrs; married – 37%; employed <12%; 70% Caucasian, 12% African American, 10% Native American, 5% Hispanics,	Effects of hospitalisation through psychiatric group. Global Assessment of Functioning (GAF) scores.	SCID (validated). Mississippi Scale for combat PTSD (validated). Conflicts Tactics Scale (validated), adapted, 4 months prior. Global measure of self-reported violence (not validated).	None detailed.	Chi square. Odds ratios. Correlations. Regression.	Different adapted CTS measures used to assess violence in NVVRS and hospital samples, more inclusive criteria in NVVRS. Psychiatric group relatively small sample.	12

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	1% Asian, 2% Other; CES – 10.3; co-morbid disorders – 91%. Compared with a group of male psychiatric patients without PTSD (*n* = 64); 52% psychiatric acute ward, 48% substance misuse; consecutive admissions with Vietnam-era military service history but no combat experience; no TBI, acute symptoms or PTSD; age – 47; 78% Caucasian, 19% African American, 3% Asian or Hispanic. Compared with a community sample of Vietnam veterans with PTSD who had never been hospitalised (*n* = 273), from NVVRS with comparable level of combat exposure; age – 40.		PTSD screening form (not validated). War stress interview – admission supplement (not validated). War stress intake questionnaire – psychopathology and substance use (not validated). Combat Exposure Scale (validated). Global Assessment of Functioning (validated).			Exclusion criteria impacts generalisability. Only 4-month interval to assess violence for patient groups but 12 months for NVVRS. Not sufficient variance in PTSD group demographics. Self-report. Not generalisable. Correlational. Over 90% of the PTSD group had co-morbid disorders.	
Study 8 Orcutt, H. K., et al. (2003)	*n* = 376 Vietnam veterans from NVVRS with PTSD, distress, or combat exposure. 24% African American, 29% Latino,	None detailed.	'Family dysfunction' (not validated). Family turmoil – IC: 0.65 Severe Punishment – 0.92 Inter-parental violence – (yes/no).	NVVRS 80% response rate to family interviews.	Structural Equation Modelling (SEM).	Retrospective self-report. Cross-sectional design of NVVRS. Ambiguity in direction of association for some	12

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	47% White/other. All married or co-habiting with partners.		Early trauma exposure – inventory of traumatic events. Relationship with Mother (not validated) IC: 0.91. Relationship with Father (not validated) IC: 0.92. Diagnostic interview schedule items relating to ASB pre-15yrs, (not independently validated) IC: 0.74. Combat exposure items, (not validated) IC: 0.94. Perceived threat items, (not validated) IC: 0.84. Mississippi Scale for combat PTSD (validated), IC: 0.94. Conflicts Tactics Scale, physical sub-scale (validated), IC: 0.9.			variables. Current psychological state of participants. Social desirability. SEM does not confirm the model it simply asserts that there are no data available to disconfirm.	
Study 9 Sherman, M. D., et al. (2006)	*n* = 179 Male veterans in couples seeking relationship therapy at a veteran family therapy clinic between Sept 1997 and Nov 2003. Co-habiting female partner.	Couples who were abusing substances or currently DV were excluded from program. Only PTSD group had combat	Conflict Tactics Scale, (physical) violence scale (validated) over last year. Locke-Wallace Marital adjustment Test (validated). Inclusion of Other in the Self Scale (validated).	Inclusion of Other in the Self Scale – data only available for half as introduced halfway.	Regression.	Couples who were abusing substances or currently DV were excluded. Inclusion of Other in the Self Scale – data only available for half as introduced halfway.	14

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	Diagnoses of PTSD: *n* = 60; age – 51; White – 82%, Black 12%, Hispanic – 3%, Indian – 3%; education – 13 years; employed – 27%. Depression: *n* = 68; age – 48; White – 94%, Black – 6%, Hispanic – 0%, Indian – 0; education – 14; employed – 38%. Adjustment disorder or partner relational problem: *n* = 51; age – 49; White – 84%, Black – 14%, Hispanic – 2%, Indian – 0%; education – 14; employed – 54%. Couples who were abusing substances or currently DV were excluded.	experience (leading to PTSD).	Demographics measure designed by author (not validated). Review of medical record (not validated).			Not enough variation in level of marital satisfaction to show significant differences. Convenience sample. Self-report. Correlational.	
Study 10 Taft, C. T., et al. (2007a)	*n* = 1168 Male veterans who served in Vietnam between August 1964 and May 1975: currently using inpatient or outpatient Department of Veterans Affairs (DVA) services; not taking any	Dealt with missing data control for age and combat exposure.	SCID (validated). CAGE (validated). Internal consistency reliability estimate was 0.87. "Aggression Measure" (not validated). Verbal and physical aggression.	Of 1,461 eligible participants: 1,328 completed the initial non-psycho-physiological study assessment. Psycho-	Structural Equation Modelling. Assessed for strongest model. Bivariate associations (correlations).	Causal indicator modelling assumes that the observable variables cause the underlying latent variable. High degrees of multicollinearity.	11

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	autonomically active medication and did not have any medical condition that might alter physiological responding. Recruitment took place on DVA programs between 1989 and 1992. 1,461 individuals met eligibility criteria from group of 2,115 veterans. Of the final sample of 1,168 participants: age 43; education 14; 67% Caucasian; 20% African American; 9% Hispanic; 2% American Indian / Alaskan Native; and 2% as Asian/Pacific Islander; mean earnings: $17, 194 per year; 52% married; 62% Army, 23% Marines, 9% Navy and 6% Air Force; "moderate" combat exposure (mean score of 18.9 on Keane's Combat Exposure Scale).		Heart Rate. Skin Conductance.	physiological testing was completed by 1,210 participants, but 42 of these individuals were eliminated owing to artefact or other technical issues, leaving data from 1,168 participants for the psycho-physiological analyses.		The cross-sectional nature of this study precluded the ability to draw firm causal conclusions. Self-report.	
Study 11 Taft, C. T., et al. (2005)	*n* = 109 Vietnam veterans interviewed as part of the NVVRS.	None detailed.	Mississippi Scale for combat PTSD (validated). Conflict Tactics Scale (validated) violence subscale	Family interview response rate in NVVRS was 80%.	t-test. Chi square. Correlations.	Modest sample size – insufficient power. Cross-sectional data.	13

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	Age 40; 89% Married; 64% Caucasian, 26% African-American, 8% Native American, 1% Asian (32% further identified themselves as Latino-Hispanic). PTSD positive if scored >89.		(physical), IC: 0.90. Diagnostic interview schedule (DIS) - co-morbid problems (validated). Dyadic adjustment scale combined with Marital dissatisfaction scale IC: 0.91 (validated). Combat exposure, NVVRS scale (validated). Atrocities exposure, NVVRS scale (validated) IC: 0.93. Perceived threat, NVVRS scale (validated), IC: 0.84. Childhood abuse and parental DV assessed with one item (non-validated).		Classification tree analysis – optimal discriminant analysis.	Retrospective self-report. Psychological state of veterans. Family-of-origin measure not broad enough. Correlational.	
Study 12 Taft, C. T., et al. (2007b)	*n* = 60 Combat veterans, served between 1964 and 1973. In a heterosexual relationship for at least a year. Self sampling – advertising responses in 1997-8 in a North-Eastern city. Small sample,	Controlled for education level, age, ethnicity, income, level of combat exposure. The level of combat exposure was significant with PTSD symptoms.	Cue Reaction Questionnaire (CRQ), designed for present study (not validated). Internal consistency 0.94-0.96. Reliable over 1 week. Clinician Administered PTSD Scale (CAPS). Blake, et al. (1990). (Validated.) Semi-structured diagnostic interview, widely used. High inter-rater reliability and internal	None detailed.	3 way ANOVA (group x condition x time). Regression.	Not controlling for interfering factors within the week that separated neutral and trauma primed measures. Not generalisable to other military groups, demographics. Directional issues as cannot tell whether trait	12

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	unequal number of PTSD (*n* = 18) and non-PTSD (*n* = 42) participants. PTSD participants: Age 51; 83% White. Non-PTSD participants: Age 52; 88% White.		consistency 0.92-0.99 with perfect diagnostic agreement for all participants. Conducted by trained and experienced researchers. State Trait Anger Expression Inventory (STAXI) Spielberger (1988) Strong reliability (validated). Beck Anxiety Inventory (BAI) Beck and Steer (1990) Good internal consistency 0.92-0.96 (validated). Conflict Tactics Scale (CTS) Straus (1979). Consistency and reliability 0.80 (validated). Participants primed with Trauma prime and neutral prime, one week apart to avoid carryover effects, order counterbalanced.			anger caused both PTSD and abuse rather than mediated them. Reliance on self-report. Some measures not validated.	
Study 13 Taft, C. T., et al. (2007c)	*n* = 265 Male veterans seeking treatment for PTSD between Sept 99 and Sept 03. 81% applying for disability status.	Level of combat exposure across combat zone.	Combat Exposure Scale (validated). CAPS (validated) IC: 0.88. Beck Depression Inventory (validated) IC: 0.92. Beck Anxiety Inventory (validated) IC: 0.94.	8 excluded due to lack of combat exposure. Missing data dealt with statistically.	Structural Equation Monitoring.	Directionality cannot be assumed. Retrospective self-report. Malingering, due to compensation seeking. Correlational.	12

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	Age 54; 81% White, 13% African American, 3% Hispanic, 2% Asian or Pacific Islander, 1% American Indian or Alaskan Native. 51% Married, 28% Divorced, 11% Never married, 6% separated, 3% co-habiting partner, 1% widowed. 79% Vietnam, 7% WWII, 7% Desert Storm, 4% Korea, 3% Other; 61% Army, 21% Marines, 11% Navy, 8% Air Force; 70% Enlisted, 24% Drafted, 6% Volunteered. 68% PTSD.		Aggression Measure (not validated). Includes verbal threats and physical violence during prior 4 months.				
Study 14 Taft, C. T., et al. (2009)	*n* = 236 Male veterans referred for PTSD screening between Jan 03 and Jan 08. Exposed to combat. 161 with partner (78% PTSD), 75 without (78% PTSD). Age – 53; 76% White, 16% African American,	Combat exposure.	Combat Exposure Scale (validated). CAPS (validated). Mississippi scale for PTSD (adapted) IC: 0.92. Beck Depression Inventory (validated) IC: 0.92. Conflict Tactics Scale (validated). Revised – Physical	510 screened, of which 333 completed. 236 completed psychometrics indicating combat exposure. Therefore, 274 from initial screening did not complete	Correlations. Regression.	Cross-sectional design limits ability to draw causal conclusions. Comparison non-PTSD group had high levels of sub-threshold PTSD. Other variables not accounted for (e.g., psychopathology, TBI, substance misuse, etc.).	11

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	2% Hispanic, American Indian or Alaskan Native, 3% Other. 45% married, 25% divorced or separated, 11% never married, 4% living with partner, 1% widowed. 63% Vietnam, 11% Desert Storm, 5% Iraq, 1% Afghanistan, 2% Korea, 2% WWII, 9% Other. 50% Army, 24% Marines, 7% Navy, 5% Air Force, 5% National Guard.		subscale and Psychological Aggression subscale: IC: 0.57 (Physical); IC :0.79 (Psychological).	assessment. Missing data dealt with statistically.			
Study 15 Teten, A. L., et al. (2010)	*n* = 94 Male veterans of Vietnam or Iraq/Afghanistan who completed routine screening for PTSD. Recruited via phone over 6 months and from announcements in the clinic. In a heterosexual relationship for 3 months prior. Iraq/Afghanistan veterans with PTSD (*n* = 27); Iraq/Afghanistan veterans	Significant difference in ethnicity proportions between Vietnam vets and Iraq / Afghanistan vets. Substance abuse, disability status and depression in both Vietnam and Iraq / Afghanistan groups.	Crowne-Marlowe Desirability Scale: Alpha = 0.83 (non-validated). Conflict Tactics Scale (revised, validated). IC: 0.92 (psychological aggression, physical and injury sub-scales). Demographic and Military Items (non-validated) including substance use, depression, TBI. As verified through medical records.	475 potential. 38% uncontactable. 11% declined. 6% not qualified 18% contacted at a later date. Of final 27%, 1/3 did not attend appointment. One Vietnam veteran's results excluded.	Chi-square. Odds-Ratio.	Co-occurring disorders are also associated with aggression. Significant CMDS results suggest social desirability issues for Iraq / Afghanistan veterans. Sample size - power not significant. Aggression may have pre-dated military service.	9

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	without PTSD (*n* = 31); Vietnam veterans with PTSD (*n* = 28). 59 Iraq/Afghanistan veterans (27 PTSD, 2 sub-threshold PTSD [PTSS], 31 no PTSD/PTSS), 35 Vietnam veterans (31 PTSD, 2 PTSS, 2 neither), 2 both. 41% White, 34% African American, 24% Hispanic, 1% Asian American; 57% Married; 19% on active duty; 57% Army, 8% Navy, 23% Marines, 2% Air Force, 4% National Guard, 6% multiple branches. Significant difference in ethnicity proportions between Vietnam vets and Iraq/Afghanistan vets.			PTSS (sub-threshold PTSD) results excluded. 2 individuals who served in both conflicts were excluded.			
Study 16 Zoričić, Z., et al. (2002)	*n* = 40 Croatian male war veterans. Average age 35. 55% single.	No other psychiatric or medical co-morbidity. All taking psycho-pharmaceuticals.	SCID (validated): inter-rater reliability 0.97. Watson's PTSD interview: agreement with SCID (0.95). Aggression rating scale A87 (validated); includes physical, indirect and verbal aggression.	None detailed.	ANOVA. Scheffe post-hoc.	Self report. Correlational.	8

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
	62% high-school educated. All have combat-related PTSD.						

Summary of Quality Assessment

The total combined number of participants was 3817, however it must be considered that there was overlap in some of the samples. There were no studies that were assessed as 'high quality' (15-20), all except one were assessed as 'reasonable quality' (7-14). Study 12 was assessed as 'low quality' (5), mainly due to a low sample size (n = 4) and no recognised methodology; it is therefore not included in the data synthesis.

There were similar limitations for many of the studies as they were similar in design. Many of these limitations would be more likely to lead to a type two error suggesting there may be a greater effect than is detailed, rather than leading to any false effects found. Cross-sectional studies are limited in their ability to infer causation between the variables and can fail to control for all possible confounding variables. In cross-sectional studies each individual pair is not compared. However, this can be done with case-control studies to look at direct relationships between the variables, although again there are often unaccounted for confounding variables. Many of the studies attempted to account for confounding variables, including demographics, although the authors generally recognise that this may not have been possible. This has also led to complex research design in comparing numerous variables.

Many studies had low sample numbers which may have impacted the statistical power, and may not have allowed for sufficient variability across the sample on some of the variables. Low statistical power can lead to 'type two' errors, meaning the null hypothesis is wrongly accepted, and no effect if found where there is one. However, most studies still found an effect, and some of the studies did have larger samples. The sampling method for all studies was biased to a certain extent. Recruiting was mainly by convenience sampling as the participants identified themselves through help-seeking. There may be characteristics of those who are help-seeking that distinguishes them from those who do not seek help. Some studies had a high attrition rate due to issues such as incomplete data and exclusion of participants who experienced borderline PTSD. Cohort studies are particularly sensitive to attrition rates with one study losing 2/3 of its sample. The analysis performed varied from basic frequencies to complex models of direct and indirect relationships accounting for different amounts of variance. The majority used correlations however. The correlational design precludes any conclusions regarding direction of causality. Therefore, the following data only provides information regarding the relationship between PTSD and the variables and mediators related to violence, rather than causation.

Descriptive Data Synthesis

In comparing the results of studies in relation to the variables they included it must be considered whether the measures used in each study are the same or, if not, whether they are indeed measuring the same construct. Similar variables across the studies have been grouped for the purposes of data synthesis and comparison of results. However, it must be noted that there has not been statistical confirmation that these variables are measuring the same construct. The differences in the samples, the constructs measured, and the measures and statistics used preclude any quantitative data synthesis, therefore qualitative synthesis was used.

Table 4 shows the grouped variables and the identification numbers of the studies that examined each variable.

Table 4

Variables Included in Each Study

Variable Group	**Studies**
Demographics	1, 2.2, 5, 6, 7, 9
Exposure	1, 2.2, 4, 6, 7, 8, 12, 14, 15
Co-Morbid conditions	5, 7, 9, 12, 13, 14, 15
General functioning	7
Family of Origin	2.2, 8, 12
Current Family Factors	4, 9, 12, 16
Affective States	1, 6, 13
Substance / Alcohol Misuse	2.2, 5, 6, 7, 11

PTSD symptoms and violence. PTSD symptoms were positively associated with levels of violence in all the studies, including physical, sexual, verbal, psychological, traffic related aggression and property damage. Zoričić et al. (2002) found that for veterans with PTSD, levels of verbal and physical latent aggression were higher than other types. Two studies that looked at the specific symptoms of PTSD related to violence, found the strongest associations with the hyper-arousal symptom cluster (Taft et al., 2007a; Taft et al., 2009). The re-experiencing symptoms also showed an association with aggression (Taft et al., 2009), although this was through physiological reactivity in Taft, Vogt, Marshall, Panuzio, and Niles (2007a). The avoidance and numbing symptoms were negatively associated with aggression in one study, although this effect disappeared when other variables were considered (Taft et al., 2007a), and showed the strongest association with violence in McFall et al. (1999). When

the symptom clusters were considered together, only hyper-arousal remained a significant predictor of aggression (Taft et al., 2009). Taft et al. (2007c) found that PTSD depression symptoms partially accounted for the relationship between PTSD and aggression. Orcutt, King, and King (2003) found the relationship between family dysfunction and childhood anti-social behaviour was only associated with violence via PTSD.

Different control groups were compared with veterans with PTSD for levels of violence. Studies included non-PTSD control groups (Beckham, Feldman, Kirby, Hertzberg, & Moore, 1997; Jakupcak et al., 2007; Sherman, Sautter, Jackson, Lyons, & Han, 2006; Taft et al., 2007b; Teten et al., 2010) as well as those with other mental health diagnoses including schizophrenia (Freeman, Roca, & Kimbrell, 2003; McFall, Fontana, Raskind, & Rosenheck, 1999), depression (Sherman et al., 2006) and substance misuse (Freeman et al., 2003). In all cases the PTSD group demonstrated higher levels of violence than the comparison group. This included physical, verbal, psychological aggression, and use of weapons. One study (Jakupcak et al., 2007) compared a borderline PTSD group who also had elevated levels of violence compared to controls. Inpatient PTSD patients reported higher levels of violence than a community PTSD group. There was no difference between rates of violence in the depressed and PTSD couples (Sherman et al., 2006). Other findings in comparing groups revealed that level of violence was linked to the severity of PTSD symptoms (Beckham et al., 1997).

The effect of PTSD on levels of violence remained when controlling for co-morbid psychopathology and combat exposure (McFall et al., 1999), and substance misuse and age (Jakupcak et al., 2007). Other variables may have an effect on this relationship however. Taft et al. (2005) compared a PTSD violent group, a PTSD non-violent group, and a non-PTSD violent group. The PTSD positive violent group indicated increased levels on all risk factors suggesting many possible mediating variables.

Demographics. The average age of all participants was 45 years, with study averages ranging from 33 to 54 years. All studies were comparable on average age, although one study did not give this information (Teten et al., 2010). In the study by Freeman et al. (2003) age was significantly higher in the PTSD group compared to the psychosis group and alcoholic group. However, the age of the PTSD group was comparable to PTSD groups in other studies and this may have been a function of the veteran status of the PTSD group. Age

was found in Jakupcak et al. (2007), Sherman et al. (2006), and Beckham, Feldman, and Kirby (1998) to be negatively associated with aggression and violence, therefore younger age was a risk factor for violence. Beckham et al. (1998) and Beckham et al. (1997) also found age negatively correlated with increased PTSD symptoms suggesting PTSD was more severe in younger participants.

All participants were male except four females included in one study; Jakupcak et al. (2007). This is not a sufficient comparison of gender differences and it is suggested that this may be a function of the over-representation of men in the military, as well as the increased likelihood that men will be exposed to combat situations.

Where information regarding ethnicity was available, ethnic groups that were represented included Caucasian, Latino, African-American, Native-American, Asian, Black, American-Indian, Alaskan-Native, Pacific Islander, and European-American, and participants were from the US and Croatia (four studies did not specify). Ethnicity was not identified as differing significantly between groups in any of the studies except Teten et al. (2010) who found differences in the ethnicity of the Vietnam and the Iraq/Afghanistan groups.

The average years of education of participants, where specified, was between 13 and 15 years, although ten studies did not give this information. In those studies that did provide this information, the number of years of education were the same for both PTSD and non-PTSD participants. However, Begić and Jokić- Begić (2001) found a significant effect of level of education on levels of violence, with lower educational level being associated with increased violence.

Where employment information was given in three studies; one indicated all participants were unemployed (Freeman et al., 2003), one reported low employment for the PTSD group compared to the control group (27% & 54% respectively; Sherman et al., 2006), and one detailed comparable employment levels amongst PTSD and non-PTSD groups (51% & 59% respectively; Begic & Jokic-Begic, 2001). Due to the age of the veterans there were a number that were retired, and those that were hospitalised were often unemployed. No studies found a significant effect of employment status.

Socio-economic group was only reported by Beckham et al. (1997) and Begić and Jokić-Begić (2001), and both studies found a significant relationship with levels of violence. Lower socio-economic group was associated with increased levels of violence.

There are no details of marriage status in five of the studies. However, in three studies all participants were married or cohabiting (as part of sampling criteria), five studies reported >50% of participants were married or cohabiting, and the remainder of the studies (3) had lower percentages of married participants, although this information was not always clear. It is not possible to state whether married status differed between the PTSD and non-PTSD groups.

In 11 of the studies PTSD participants were in treatment; inpatient (two studies), outpatient (seven studies), or a mixture of both (two studies). This was accounted for in one study by comparing inpatient and outpatient populations (McFall et al., 1999), which identified a significant effect of inpatient status on increasing violence.

Only one study specified that all participants were taking psychoactive drugs (Zoričić et al., 2002), however the remainder of the studies did not account for this variable. This has therefore not been investigated as a potential variable in the studies.

One study did not state which combat zone the veterans were deployed to (Zoričić et al., 2002), ten studies included veterans who had served in Vietnam only, one study included participants who served in the Balkans (Begić & Jokić-Begić, 2001), one study included those who served in Iraq and Afghanistan (Jakupcak et al., 2007) and three included participants who had served in a mixture of combat zones (Taft et al., 2007c, Taft et al., 2009, & Teten et al., 2010). None of the mixed studies found a significant effect of combat zone.

Exposure. Level of combat exposure was included as a variable in nine studies, with varying results. Combat exposure was only directly positively associated with violence in Taft et al. (2009), although this relationship was only present for those with partners. There was no association between combat exposure and aggression in Jakupcak et al. (2007). However, it was indirectly linked to aggression through PTSD in a number of studies (Byrne & Riggs, 1996; Taft et al., 2007a; Taft et al., 2007c), and specifically through the hyper-arousal and avoidance symptom clusters (Taft et al., 2007a). However, Orcutt et al (2003) found combat

exposure had a negative correlation with violence without PTSD as a mediator. Combat exposure was also indirectly linked to aggression through depression (Taft et al., 2007c), and was significantly associated with increased trait anger and hostility (Jakupcak et al., 2007). In Orcutt et al., (2003) level of combat exposure was directly linked to childhood anti-social behaviour. This finding suggests that individuals who exhibited anti-social behaviour when younger were more likely to be placed in situations of combat. PTSD positive individuals who were violent report significantly higher combat exposure than the non-PTSD partner violent group (Taft et al., 2005).

Beckham et al. (1998) found exposure to atrocities was significantly related to overall PTSD symptom severity, and more specifically re-experiencing symptoms, as well as guilt cognitions. It accounted for a small but significant amount of the variance in the model developed by McFall et al. (1999). In comparing groups for levels of atrocities exposure, Taft et al. (2005) found those with PTSD who were violent reported higher levels of exposure than those with PTSD who were not violent, or non-PTSD violent groups. Overall this suggests that atrocities exposure is related to levels of PTSD but also to levels of violence in those with PTSD.

Co-morbid conditions. Several different co-morbid conditions were examined. Depression was included as a variable in four of the studies. It was significantly associated with violence in Sherman et al. (2006), Taft et al. (2007c) and Taft et al. (2009), although in the latter study this relationship did not remain when accounting for other variables. Depression did moderate the relationship between PTSD and aggression in Taft et al. (2007c). This was supported by McFall et al. (1999) who found no significant effects of depression on violence. There was no difference between the PTSD and depressed groups in levels of violence in the study by Sherman et al. (2006). Schizophrenia was examined as a variable by Freeman et al. (2005), with individuals with schizophrenia scoring lower than the PTSD group on aggression and hostility measures. Taft et al. (2007b; 2007c) included anxiety as a potential variable associated with PTSD, however no direct link was observed. Anxiety was not associated with aggression when accounting for other variables, although it was indirectly related through depression and PTSD (Taft et al., 2007c). Other co-morbid disorders were considered in McFall et al. (1999) who found that co-morbidity did not account for violence in the inpatient PTSD group. However, Taft et al. (2005) did find that co-morbid psychopathology was associated with violence.

General functioning. Level of functioning was found not to be related to levels of violence by McFall et al. (1999).

Family of origin factors. Childhood physical abuse experiences were unrelated to violence in Beckham et al. (1997). Taft et al. (2005) also found no significant differences between the PTSD partner-violent and the non-PTSD partner-violent group, or the PTSD non-partner violent group in family of origin variables. However, Orcutt et al. (2003) found the higher the level of family dysfunction, the greater the level of childhood anti-social behaviour, and the greater the report of PTSD symptoms which was associated with violence. Therefore, the veterans' background was found to indirectly impact their level of violence, although the quality of their relationship with their parents did not have an effect.

Current family factors. Taft et al. (2005) found the PTSD partner-violent group scored highest on all family and relationship dysfunction variables, and Byrne and Riggs (1996) found current relationship conflict mediates the relationship between PTSD and aggression. However, Sherman et al. (2006) found marital satisfaction was no less for PTSD couples than for couples where other psychopathologies were present. It is also of note that Teten et al. (2010) found those with PTSD were more likely to report being the victim of violence from their partners.

Affective states. Anger was investigated as a variable by Taft et al. (2007b) who reported that trait anger, state anger, and trauma cued anger were all significantly related to PTSD, although only trait anger was indirectly related to violence through PTSD. Jakupcak et al. (2007) found reports of anger were greater in the PTSD group, and borderline PTSD group, when compared with controls. Combat exposure was also significantly associated with anger, however the relationship between PTSD and anger remained when accounting for combat exposure. Beckham et al. (1998) found increased guilt cognitions were related to higher levels of atrocities exposure and younger age.

Substance misuse. Begić and Jokić-Begić (2001) report in their study, 60% of the violent patients were under the influence of alcohol. Of the four other studies that considered alcohol misuse as a variable, Beckham et al. (1997) found it did not impact levels of violence and Freeman et al. (2003) found the group with PTSD and the group with schizophrenia diagnoses scored higher on the aggression questionnaire than the problem alcohol use group.

However, current alcohol use levels were the same in these three groups, therefore could be considered as controlled for. Both Freeman et al. (2003) and Jakupcak et al. (2007) also found a significant relationship between PTSD and violence when controlling for alcohol misuse. However, Taft et al. (2007a) found an association between PTSD, alcohol misuse and aggression. They found that hyper-arousal PTSD symptoms had an indirect association with aggression through alcohol; however re-experiencing symptoms had a negative association with levels of aggression through alcohol. The relationship between PTSD and violence remained when controlling for substance misuse, although substance misuse did account for some of the variance (McFall et al., 1999).

Discussion

Main Findings

This systematic literature review considered the relationship between PTSD and violence in military personnel and veterans, and the potential variables that mediate this relationship. After systematic search procedures were applied and the resulting studies were assessed for quality, 16 research articles remained. The data from these articles was extracted and synthesised in order to provide an overall picture of the relationship between PTSD and violence, as represented in the literature. The previously observed (Kulka et al., 1990) positive relationship between symptoms of PTSD and the perpetration of violence in military populations was supported. The nature of this relationship was explored and certain other variables were also found to account for this relationship and are discussed here. The applicability of these findings is discussed based on the limitations in the review.

All studies included in the review were unanimous in finding a positive relationship between PTSD and violence. Those studies that compared groups were also unanimous in finding the PTSD group showed the highest levels of violence. There were also variables that mediated this relationship.

Certain demographics have been found to increase risk of violence in the wider population and were shown to impact levels of violence in this group. In particular there was a significant effect of age on the relationship between PTSD and violence, with younger individuals being more vulnerable to PTSD and violence, as well as both together. Socio-economic group and levels of education were also negatively linked to violence in some

studies, which again has been observed in other populations (Wood, 2006). Similar results were reported for the US and Croatian studies suggesting that these results may be generalisible across different populations. However, the scope of the nationalities represented in the sample was limited therefore this would need expanding to other countries.

A risk factor that has been widely linked to violence in the general population is substance misuse (Webster et al., 1997). However, this link was less clear in the current studies. Alcohol use impacted levels of violence through certain PTSD symptoms, although this relationship existed independently of alcohol use also. There were a limited number of studies that looked at the effect of substance misuse and it was more often controlled for rather than investigated.

Problems in the military personnel/veteran's childhood and family of origin were only found to indirectly impact violence through increased levels of child-hood anti-social behaviour and later increased levels of PTSD. It seems that general dysfunction in the family was associated with prior criminal behaviour and the relationship between prior criminal behaviour and current violence was facilitated by PTSD.

Problems in families of the military personnel/veterans were found to mediate the relationship between PTSD and violence, and this is pertinent given the majority of violence reported was intimate partner violence. However, there were indications that problems in relationships were present for other psychiatric disorders also, and that the violence was mutual which may indicate contextual precipitators of violence.

The significant effect of in-patient status on levels of violence may be due in part to the stresses within this context, but also the severity of the PTSD symptoms as implied by their inpatient status. A variable that was not accounted for in this setting that may impact levels of violence is the use of prescribed psychoactive medication. However, this would be more likely to decrease the incidence of violence. Co-morbid disorders such as depression appeared to have their own impact on levels of violence, and this is reflected in literature on mental illness and violence (Mullen, 2006). However, the effect of PTSD remained independent of co-morbid disorders.

Chemtob et al. (1994) found that 24 veterans of the Vietnam War with PTSD diagnoses scored significantly higher on an anger factor, comprising multiple measures of anger, than did comparison groups of 23 well-adjusted Vietnam combat veterans and 12 non-combat Vietnam-era veterans with psychiatric diagnoses. Anger was also found in this review to be linked to PTSD, however a link to violence was only found in one study. This was not a variable that was explored by many studies however.

Although the variables listed above have often also been identified as risk factors for violence in the general population, variables which may be unique to this population relate to the experiences that military personnel/veterans are exposed to in combat. Although some direct links to violence were observed, these experiences were mainly found to relate to increased levels of violence through PTSD symptoms.

Applicability of Findings

The majority of this research has been conducted with Vietnam veterans in the USA. Therefore, some of these results may not be generalisable to veterans of other conflicts. However, Teten et al. (2010) found that there was no difference between Vietnam veterans and Iraq/Afghanistan veterans on aggression measures.

The extent to which this research is generalisable to civilian populations has not been confirmed. However, many of the risk factors for violence found are also well documented in research on civilian populations, suggesting there are shared risk factors for violence. The only variable which may have been unique to the population was combat experience, which was associated with violence through PTSD. It is suggested that a review of the presence of risk factors for violence in PTSD in a civilian population may reveal similar results.

Limitations

In comparing the results of studies in relation to shared variables it must be considered as to whether the measures used are the same or, if not, whether they are indeed measuring the same construct. This could be done through statistical correlations. Not all measures used in the studies were validated and there may have been overlap in some of the items in the measures. Measures were also often reliant on self-report which may have led to bias in the information provided. It is possible that violence was under-reported due to social

desirability issues, or perhaps PTSD symptoms may have been over-reported due to the compensation seeking status of the participant.

Due to the variation in study design only qualitative data synthesis was possible. This leaves the potential for author bias in the interpretation of results. Secondly it does not allow for the correct weighting to be given to the results from different studies depending on the quality of the study and the sample size. A meta-analysis approach to exploring the literature would have produced more robust and less biased findings, and would have assigned proportionate weightings to each study based on the sample size. However, this was not possible due to the many of the samples being duplicated between studies (data was often taken from the NVVRS study), and because the measures used differed between the studies. The quality assessment applied was somewhat arbitrary, and did not provide different weightings to each item proportionate to the impact on the quality of the study. The reliability of the quality assessment could have been demonstrated through using multiple raters and assessing inter-rater reliability. Also, the quality assessment criteria were not weighted to take into account the extent of the impact of each criterion on the quality of a study, which could have also been considered. The quality assessment process revealed similar scores between the studies as there were limitations that many of the studies shared. Firstly the sampling for all studies was biased, perhaps due to the nature of the population, and as such there is limited generalisability of these results. Some data were drawn from the same data set, therefore there may be some overlap in participants which cannot be identified. Secondly there were numerous variables under investigation and complex relationships emerged that may have been simplified in the process of data synthesis. Even given the numerous variables accounted for, it still cannot be suggested that the studies will have accounted for every potential variable in the relationship between PTSD and violence. Alongside this the analyses used in the studies were correlational and as such cannot infer the direction of causality in the relationships found.

Although the exclusion of unpublished studies ensures the included research has been peer reviewed, this may also lead to the exclusion of good quality research. There may be other reasons for research remaining unpublished. Researchers may be less likely to publish research which does not find an effect in the way they had anticipated. On this basis, there may be unpublished research that contradicts the findings detailed here.

Conclusions and Recommendations

Implications

The relationship between PTSD and violence is supported by the studies in this review. However, there are still numerous relationships with other variables that may in part account for this relationship, including demographics, family dysfunction, co-morbid disorders, contextual factors, affective states and substance misuse. Given that there are numerous variables identified which are also recognised risk factors in the general population, the risk in military populations may be similar. However, it remains to be established if these risks were elevated prior to the onset of PTSD or since. Significant methodological limitations preclude any causal inferences from the results of the research so far.

Recommendations for Future Research

Differing methodological approaches to research in this area could be considered and standardised measures will need to be used where possible. There is potential for the findings within this population to be generalised to civilian populations where the presence of PTSD may also impact levels of violence. There is also potential to consider the impact of static risk factors and dynamic risk factors on violence in this group, which could help to identify if risk is found to manifest only since military service. This could include consideration of the role of protective factors prior to and post military service. This has potential implications for risk assessment of violence.

The majority of mediating factors identified here do not explain the psychological processes between PTSD and violent behaviour. Anger is one psychological mediator that has been explored in a number of research studies into mediators of PTSD and violence as it is a common symptom of PTSD. However, anger does not function in isolation, there are associated cognitions. The General Aggression Model (Anderson & Bushman, 2002) details the importance of cognitions and information processing in the instigation of violent behaviour. The Ehlers and Clark model of PTSD (2000) identifies changes in cognitions following the experience of trauma leading to thoughts such as “I am not safe” and “other people think I am weak”. These cognitions may facilitate the perception of threat and trigger a ‘survival mode’ (Chemtob et al., 1988) impacting information processing and the interpretation of situations. Imagined violence can act as rehearsal of violent behavioural

'scripts' which become increasingly accessible as a behavioural response (Huesmann, 1988), particularly after witnessing violence (Smith et al., 2009).

Therefore, future research could explore the conditions associated with anger in PTSD, such as cognitions linked to anger and increased risk of violence. Such research could help to inform cognitive behavioural treatment of violent behaviour in PTSD through identifying problematic cognitions. Measuring such cognitions can be difficult; however, the Firestone Assessment of Violence Thoughts has been identified as one such measure. The following chapter presents an evaluation of a measure of cognitions associated with violence, followed by a research study investigating the role of violent cognitions in mediating PTSD and violence.

Chapter Three

Psychometric Critique

The Firestone Assessment of Violent Thoughts

Introduction

The Firestone Assessment of Violent Thoughts (FAVT) was published in 2008 and was developed by Robert W. Firestone, PhD and Lisa A. Firestone, PhD. Firestone and Firestone are part of the Glendon Association in the US, conducting research and providing training for mental health professionals. They identified that although psychometrics existed for assessing thought processes related to sexual offending, there was nothing similar in relation to violent offending (Doucette-Gates, Firestone & Firestone, 1999). The FAVT was designed as a self-report measure to identify violent thoughts on the basis that they are associated with violent behaviour. The assessment describes thoughts, attitudes and beliefs experienced through the individual's inner 'voice' (Firestone & Firestone, 2008). They assert that this inner 'voice' can impact an individual's behaviour and risk of violence. This concept appears to be related to cognitive psychology, however Firestone and Firestone (2008) focus on psychodynamic principles, describing this internalised 'voice' as representative of the individual's experiences of their early caregivers. They suggest the measure can be used as part of violence risk assessment, but also for prevention of violence and the identification of individual treatment needs and outcomes. The FAVT is reviewed here in terms of its psychometric properties, such as reliability and validity, as well as its usefulness and empirical foundations.

Overview of the FAVT

The FAVT consists of a series of statements reflecting thoughts and beliefs related to violence. The statements have been designed to reflect one's own thoughts, presented as though they were another person speaking. This is what Firestone and Firestone describe as the inner 'voice' (Firestone, 1988, 1990, 1997). They suggest this 'voice' is a pattern of negative thoughts accompanied by angry affect. These negative thoughts are purported to develop through traumatic experiences as a child (Firestone, 1988, 1990). 'Voice attacks' are described as experiences of introjected negative messages as though they were the voices of the individual's parents or early caretakers (Firestone & Firestone, 2008). Therefore, Firestone and Firestone (2008) suggest an individual who experienced an abusive childhood would experience more severe 'voice attacks' than others, associating these attacks with early trauma. The 'voice' and subsequent violent thoughts are hypothesised to prime violent behaviour, therefore Firestone and Firestone (2008) suggest they can be used to assess risk of violent and aggressive behaviour, but also to prevent violence and inform treatment.

The respondent is required to self-report whether the statement reflects their own thoughts or not, using a three point Likert scale of *never/rarely, sometimes*, and *frequently/always.* Individuals scoring 1.5 standard deviations above the norm are considered to have scores in the elevated range, and those scoring two standard deviations above the mean are considered to have highly elevated scores. The items in the assessment have been grouped into five 'levels': *paranoid/suspicious* (e.g., they are out to get you), *persecuted misfit* (e.g., they are going to make a fool of you), *self-depreciating/pseudo-independent* (e.g., you have to take care of yourself because no one else will), *overtly aggressive* (e.g., violence is the ticket), and *self-aggrandizing* (e.g., you are number one). The FAVT is also divided into two theoretical subscales: *instrumental/proactive* violence and *hostile/reactive* violence. The concept of hostile versus instrumental violence has been widely used in the functional analysis of violent behaviour and relates to whether the individual uses violent behaviour in pursuit of an alternative goal, such as robbery (instrumental violence) or in response to an emotionally arousing situation (hostile violence) (Maguire, 2004). There are also two validity scales built into the FAVT: the *negativity* scale, and the *inconsistency* scale. The *negativity* scale includes the items that are rarely endorsed at the extreme level, even in the most violent samples. If an individual endorses many of these items at the highest level they are considered to be responding in an unusually negative manner to the assessment. The *inconsistency* scale compares the responses to pairs of similar items to assess the consistency of the responses. Finally, the FAVT also provides data to establish the significance of differences between pre-treatment scores and post-treatment scores.

A pilot study in the development of the FAVT was conducted by Doucette-Gates et al. in 1999 with a group of 576 participants in order to develop the measure. Firestone and Firestone (2008) then obtained a standardisation sample of 639 members of the US public in order to establish norms and conduct further analyses of the properties of the FAVT. The development of the FAVT and the authors' analyses of the validity and reliability of the FAVT is examined here, giving consideration to the literature regarding effective psychometric test development.

Characteristics of a Good Test

Kline (1986) suggests a psychological test is good if: it is at least an interval scale; it is standardised, reliable and valid; and it discriminates between groups, as well as having appropriate norms.

Normative Sample

Doucette-Gates et al., (1999) obtained a sample for the initial development of the FAVT which included 576 males, 63% of whom had a history of violent behaviour. They were recruited from a range of groups in the US including individuals on parole, individuals in custody, individuals under community psychiatric supervision, and a non-clinical sample from community and civic organisations (not specified). Participants currently engaged in anger management or conflict resolution programmes were excluded from the study as this may have impacted their responses (Doucette-Gates et al., 1999). This diverse sample enabled the FAVT to be developed within different populations, including a psychiatric population, allowing good generalisation to a variety of individuals. However, of the initial 654 eligible participants 78% were male. As such, there was an insufficient female sample to include them in the study; therefore, female participants were excluded leaving a sample of 576 (Doucette-Gates et al., 1999). Of the final sample, Doucette-Gates et al., (1999) report 71% of participants were in custody, 12% were on parole, 6% were engaged with outpatient mental health services, and 11% were individuals from community and civic organisations. There was some demographic diversity in the sample with 67% of participants Caucasian, 18% African American, 9% Hispanic/Latino, 4% Native American, and 2% Asian. The mean age of the participants was 33.7 years with an age range of 17-74 years. Of this sample, 63% were identified as having engaged in violent behaviour (Doucette-Gates et al., 1999). This information was obtained from participants' official records. An individual was considered to have a history of violent behaviour if they had received a conviction for violent offences including rape, assault, battery, manslaughter, homicide, reckless endangerment of others, sexual assault, and threats with weapons (Doucette-Gates et al., 1999). Individuals classified as non-violent included those who had convictions for non-violent offences and community samples who self-reported no violent behaviour. This indicates that criminal record checks were not performed for the community sample, representing a difference in the way violence was measured between the groups. It is possible that self-reported non-violent

status may have been inaccurate due to a reluctance to disclose offending, leading to incorrect classification. Similarly, categorising the individuals on the basis of convicted violence only, will have excluded any unconvicted violent offenders.

Following the development of the FAVT, a standardisation sample was obtained through an internet survey in 2007 by Firestone and Firestone (2008). Potential respondents were excluded if they were currently incarcerated or receiving psychiatric treatment, had uncorrected vision or hearing loss, or were unable to read English at the third grade level (on the basis of the Flesch-Kincaid model; Flesch, 1974). The sampling did not exclude women who formed 50% of the sample. Of those contacted through the US Census, 639 individuals responded anonymously and met the criteria. The sample was considered a close match to the demographics of the US population when compared to the Census (Firestone & Firestone, 2008). Of the standardisation sample, 15% had a history of arrest. An incarcerated reference sample (n = 80) and an anger management reference sample (n = 68) were also obtained from a single US prison in 2007. Within the standardisation sample, an analysis of variance and post-hoc analysis revealed there was a significant negative relationship between age and FAVT scores suggesting violent thoughts reduce with age. Firestone and Firestone (2008) also found that men scored higher on most FAVT scales compared to women in the sample, although women scored higher on the self-aggrandising and self-depreciating/pseudo-independent scales. Their analysis also found that African-Americans scored higher overall on the FAVT than Caucasians, as well as on some of the individual scales. Finally, there was a main effect of education level on the self-depreciating/pseudo-independent and instrumental/proactive scales; and post-hoc analysis revealed those who did not progress to further education scored higher than those who did complete further education (Firestone & Firestone, 2008).

The effects of age and gender accounted for 5% and 10% of the variance in the scores respectively. Although there was a significant effect found for ethnicity and education they accounted for only 3% and 2% of the variance, respectively. On this basis, Firestone and Firestone (2008) suggest the differences related to ethnicity and education are not of clinical significance. Therefore, the standardisation norms have only been divided by age and gender. Demographics were not found to be significant in the reference groups.

The FAVT appears to have been developed and standardised on a wide range of sample populations within the US, producing a good normative sample for comparison and allowing for generalisability. However, the initial development of the FAVT excluded females in the sample as there were insufficient numbers, yet the standardisation sample included both genders. This represents a discrepancy between the development and standardisation samples, particularly as a main effect of gender has been found. The higher scores in males may be due to the FAVT being developed with males only, however it could also be suggested this would be expected on the basis that men generally report more violence than women (e.g., Monahan et al., 2001). There were also differences in the way violence was measured between the groups in the development sample (i.e., some based on official records, some self-report), which could have led to incorrect classification. Finally, the main effects of education and ethnicity have not been taken into account when producing normative data, although the authors provide a justification for this. The normative samples could be broadened further as the FAVT has not yet been demonstrated as appropriate for use with an inpatient psychiatric population or a learning disabled population, for example.

Item Selection

The FAVT was developed using item response theory (IRT) as an alternative to classical test theory. Classical test theory focuses on an individual's overall test score rather than individual items and hence, although respondents to a psychometric may achieve the same score, their experiences of the construct being measured may have been very different. Taking the example of two individuals who achieve exactly the same score on a depression and anxiety scale, one may have endorsed all items related to depression and the other person may have endorsed all items related to anxiety. IRT overcomes this limitation by predicting an individual's response to each individual item, highlighting this difference. In classical test theory, the items are also unable to represent different difficulty or severity levels, whereas in IRT there is a hierarchical structure to the items using the Rasch Model, which is stepwise rather than continuous. Therefore, if the more severe/difficult items are endorsed, it can be assumed the less severe/difficult items will be endorsed also. In this way IRT aims to develop tests that are cumulative (Kline, 1998).

Potential items for the FAVT were generated through discussion with therapists employing Firestone's 'voice' therapy. Discussions identified common thoughts emerging in therapy that appeared to be associated with violence. Following this, individuals undergoing voice

therapy were asked to review the initial 187 items of the FAVT to comment on whether there were any thoughts missing that they have previously experienced leading up to and during an incident of violent behaviour. In the development of the FAVT items, the initial 187 items were administered in the pilot version. Mean-squared, infit and outfit analyses were used to consider the response patterns at each extreme end of the scale and the moderate items of the scale respectively. In IRT analysis, according to the Rasch model, a milder item would be expected to be endorsed if a more severe item is also endorsed (Kline, 1998). Items that did not follow this pattern were identified and removed by Doucette-Gates et al. (1999) using the item fit analysis. However, there would be a lack of variability if this pattern were followed perfectly, therefore it would be considered an 'overfit' and deterministic (De Ayla, 2008). Items with infit and outfit values below one may overfit the model representing redundancy, and values substantially greater than one represent noise from other variables impacting the data (De Ayala, 2008). Where there was missing data, the respondent's mean response to the other items was used. This method can lead to significance where significance would not otherwise have been found (Field, 2005). However, it was rarely used as the data were almost complete, therefore it was required for no more than one item for each individual. In Doucette-Gates et al.'s (1999) IRT analysis, 70% of the 187 FAVT items were removed to leave the final 56 items.

Initially a five point Likert response scale had been applied to the FAVT items, however the differentiation between the scale points *never* and *rarely*, and *frequently* and *always*, was assessed as low for many items. Therefore, these options were collapsed to leave a three point Likert scale (Doucette-Gates et al., 1999).

Subscales

Analysis of the FAVT then looked at where there appeared to be sub-constructs or 'factors' within the construct of 'violent thoughts'. This was identified through factor analysis by looking at patterns of responding to items that suggest they could be similar. Factor analysis was performed on the final FAVT items which allowed Doucette-Gates et al. (1999) to identify latent variables which contributed to the construct of violent thoughts. The reliability of factor analysis is dependent on sample size, with 300 being suggested as a good sample size (Comrey & Lee, 1992; Tabachnick & Fidell, 1996). On this basis, the sample obtained by Doucette-Gates et al. (1999) of 576 would be considered more than sufficient for factor analysis.

There are different methods for identifying the number of factors within a construct. Eigenvalues indicate the size of a factor, and each variable has an eigenvalue of one, therefore factors must all have eigenvalues above one to be of interest (Kline, 1998). Although eigenvalues are not provided by Doucette-Gates et al. (1999) it is suggested by Stevens (1992) that using a scree plot is sufficient to identify factors with sample sizes of over 200. Factor analysis with the FAVT used scree plots to identify the number of factors, and they were examined for the interpretability of the grouped items. A notable point in the curve on the plot gives an indication of where the cut off for the number of factors lies (Cattel, 1966). Items that loaded on more than one factor were considered by three raters as to which factor they were to be included in, and rotation was used to maximise the loading on one factor and minimise the loading onto other factors. Rotation looks for the best solution as to which factors the items load onto, without changing the correlations (Kline, 1998). When it is expected there will be independent factors present, orthogonal rotation allows higher loadings of fewer variables on each factor, simplifying interpretation (Field, 2005). However, Cattel (1978) highlights that it is unrealistic to assume that the factors would be independent, and it could be argued that the factors in the FAVT would be expected to correlate because they are all considered to be related to violent thought processes, in which case oblique rotation may be used which maximises the eigenvalues (Kline, 1998). Orthogonal varimax factor rotation was used to improve interpretation of the factors in the FAVT. Stevens (1992) suggests for a sample of 600, items loadings on the factor should be greater than 0.21 and recommends only items with factor loadings of at least 0.4, explaining 16% of the variance, should be interpreted. The lowest factor loading of any of the items in the FAVT was 0.505, therefore meeting this criterion.

In looking at the themes within the factor items, four factors were initially arrived at after rotation: *social mistrust,* which accounted for 38% of the variance; *perceived disrespect/disregard,* which accounted for 12.1% of the variance; *negative critical thoughts,* which accounted for 8.2% of the variance; and *expression of overt aggression,* which accounted for 5.6% of the variance (Doucette-Gates et al., 1999). Overall this solution accounted for 63.9% of the variance (Doucette-Gates et al., 1999). Kline (1998) suggests 70% of the variance should be accounted for; the more the better. This factor solution falls just short of this recommendation. If a low amount of the variance is accounted for it may mean the test measures a different variable to the factors, or that the test is unreliable and has a high error (Kline, 1998). Therefore, these figures could indicate the FAVT does not

measure the construct of violent thoughts as it claims to, but rather four other related constructs (the four factors). However, it could also mean there are four elements to the construct of violent thoughts. It is important the construct being measured is a recognised construct in order to determine which it is (Field, 2005). The use of oblique rotation instead of varimax could also have helped to demonstrate where factors are inter-related (Field, 2005).

Many of the items of the FAVT appear to be potentially linked to other constructs which may moderate violence. It could be suggested the FAVT represents grievance thinking, paranoid ideation, negative self-image, anxiety, hostile attribution bias, narcissism, judgemental attitudes, and the planning and justification of violent behaviour. However, relationships between the factor constructs were demonstrated with moderate to good correlations between the subscales of between 0.61 and 0.78 (Doucette-Gates et al., 1999), which suggests there is an overall relationship between these constructs.

Firestone and Firestone (2008) later renamed the four factors, as well as adding extra items and an additional factor. They decided to go back to the original items and add an additional item to the *paranoid/suspicious* scale, two additional items to the *persecuted misfit* scale, three additional items to the *self-depreciating/pseudo-independent* scale, and four items to the *overtly aggressive* scale. This was felt to increase the content validity of the scales. A fifth factor was also added to the FAVT, even though it was not identified in the factor analysis, on the basis of having identified it as an important construct through discussions with 'experts'. This scale was made up of four additional items and termed *self-aggrandising*. These additions appear to disregard the factor analysis and there are no data available on the new scales. Confirmatory factor analysis could be undertaken with the new scales in order to consider whether these additions were appropriate, but this does not appear to have been done.

In determining the theoretical subscales of *instrumental/proactive* aggression and *hostile/reactive* aggression, the authors asked experts to identify which items related to each type of violence. They then performed correlational analyses and principal components analyses fixed at one factor in order to identify weak items on the basis of negative, poor or excessive correlations, improvements in item-total correlations when items were removed, and the factor loadings of the items. This led to four items being excluded from the

instrumental/hostile scale and the final solution accounted for 34.54% of the variance. All factor loadings were between 0.5 and 0.64. For the hostile/reactive scale, three items were removed and the final solution accounted for 44.16% of the variance with factor loadings between 0.56 and 0.75.

In developing the inconsistency scale, five item pairs were selected on the basis that they showed the strongest correlations with each other. The frequency of inconsistent endorsement of these items was then examined in the sample data. In developing the negativity scale, ten items were identified that were endorsed at the highest level by fewest respondents. The percentage of responses at this level to these items was calculated for each normative sample for comparison.

Standardisation

The FAVT can be described as a standardised measure which ensures the results of the test are not dependent on the administrator. It is completed by the individual, therefore results should not differ depending on the administrator. However, reliance on self-report presents its own problems, such as socially desirable responding and individual differences in the interpretation of the items. The readability of the FAVT was assessed using the Flesch-Kincaid formula (Flesch, 1974), which indicated that individuals with fifth or sixth grade education should have no difficulty in comprehending the assessment. However, there appears to be scope for differing interpretation of some of the items, such as the item "why don't you fix things once and for all", which could be interpreted as dealing with a problem in an appropriate or inappropriate manner. Individuals may also generalise the thought and endorse the item on the basis of having had similar thoughts. The issue of interpretation could be reduced by enabling discussion of the meaning of the item with an administrator should any confusion occur.

Discriminating

A good test should also discriminate between individuals, as Kline (1986) points out: it is not useful if everyone who takes the test achieves the same score, it will not highlight any differences between individuals. This can be measured using Ferguson's delta which is not reported by Doucette-Gates et al. (1999). Ferguson's delta gives a measure of the discriminative ability of a test comparing the greatest number of discriminations possible given the sample size and the number of items, and the number of discriminations made by

the test (Kline, 1986). However, it would seem very unlikely that individuals will report having had exactly the same thoughts. There was insufficient variability in the number of individuals reporting previous violence in some of the groups in the sample to be able to analyse them, as discussed later. Notwithstanding this, the FAVT is reported to achieve retrospective discrimination between groups of individuals who have a history of violent convictions and those who do not (Doucette-Gates et al., 1999), as well as between groups engaged in anger management and those who are not, and between those who have been arrested and who have not (Firestone & Firestone, 2008). Therefore, the FAVT can be said to be discriminating between violent and non-violent individuals and distinguish those with anger difficulties. The authors also claim the FAVT can be used to predict violent behaviour for those individuals who report high levels of violent thoughts. However, there is a risk of false positives in using the FAVT in this way, as violent thoughts did not account for all of the variance between the groups (see ROC analysis in 'Predictive Validity' section).

Reliability and Validity

Examining reliability and validity ensures the test is measuring what it claims to measure, and that it will measure it consistently. A test is not useful if it is not possible to determine what it tells you, nor if it tells you something different about the individual each time it is administered, assuming there have been no changes in the individual or the conditions. If a test is shown to be reliable, differences in an individual's scores between administrations can be attributed to changes in the individual, rather than the test. For example, the FAVT may be re-administered following treatment in order to identify any change in the violent thoughts the individual experiences. Research using the FAVT has attempted to demonstrate its reliability and validity in a number of ways.

Test-Retest Reliability

Kline (1998) suggests test-retest reliability is an essential attribute for any measure. Re-administering a reliable test after a period of time to the same subjects should yield the same score in both instances, assuming there have been no changes in the individual's situation (Kline, 1986). The scores from each administration can be checked for how similar they are using correlational analysis. It is recommended the correlation between the scores is at least 0.7 (Kline, 1998). A subset of the FAVT standardisation sample (n = 23) were re-administered the test after a period of between 73 and 129 days (Firestone & Firestone,

2008). The fluid nature of cognitions could lead to differences in scores very quickly, rather than being due to the test being unreliable, which could present problems with this analysis. However, the correlations between the scores were significant at 0.74 for the FAVT overall, and between 0.61 and 0.85 for the scales, suggesting good test-retest reliability.

Internal Reliability

Kline (1986) suggests, "a test is said to be reliable if it is self-consistent" (p. 2). This type of reliability refers to the internal reliability of a psychometric, in how the items relate to one another to ensure they are measuring the same thing. However, the bandwidth fidelity of the test is also considered important. If the reliability were too high then this indicates the items are all asking the same question (Cattel, 1966). High reliability between all the items could suggest they are not measuring sufficient variability within a construct and they do not offer new information. However, including a few items that ask the same thing may be a way of ensuring concurrent validity (see below). Assessment of internal reliability can be performed through correlations between the items using Cronbach's alpha, or alternatively through splitting the items in half randomly and correlating them with the scores on the other half of the items. If all of the items are measuring the same thing then the two halves should reveal similar scores for an individual.

The Cronbach's alpha reported for the internal reliability of the pilot version of the FAVT overall was 0.96; a high correlation, with a standard error of 3.42. The alpha for the subscales was reported as ranging from 0.88 to 0.90 (Doucette-Gates et al., 1999). In the standardisation sample the overall Cronbach's alpha remained high at between 0.95 and 0.97 across the samples. Within the subscales, internal consistency alphas were between 0.75 and 0.92 across the different samples other than for the *self aggrandising* scale, which showed lower internal consistency at between 0.44 and 0.75. The authors highlight that this scale only contains four items, therefore increasing the impact of variation in the scores. However, this scale was not identified through factor analysis therefore the poor internal reliability could indicate that this scale does not represent a construct measured by the FAVT.

The item-total correlations are also reported as a measure of internal consistency. Items should correlate fairly well with each other; those that are completely correlated are measuring the same variable, and those that do not correlate at all are not linked to the same construct, and both should be eliminated (Field, 2005). The average item total correlations

ranged from 0.51 to 0.58 for the FAVT overall and within the subscales ranged from 0.49 to 0.75 which appear to be within the desired moderate range; they correlate, but not to the extent that they are measuring the same thing.

Face Validity

A test can be examined by researchers, but also by the subjects, to establish if the items appear to be measuring the construct the test claims to be measuring. Kline (1986) suggests the purpose of this type of validity is more to ensure those that take the test find it acceptable. In the development of the FAVT items, individuals undergoing 'voice therapy' treatment for violence were consulted regarding the validity of the selected items. The variety of thoughts and attitudes reflected within the FAVT items that do not obviously appear to be directly related to violent behaviour could present an issue in this area. The items grouped into the subscale of *overtly aggressive*, appear to be most directly related to the concept of violent thoughts associated with violent behaviour, as the thoughts appear to reflect plans for violent behavioural responses. However, the amount of variation explained by this particular subscale was the least of all the subscales at 5.6%. Given that these items are the ones that appear most obviously related to violence, it may be that individuals are less willing to endorse them due to their more obvious lack of social acceptability. This is where face validity is not helpful in a test. The other subscales could be considered to be measuring negative attitudes that may or may not prime violent behaviour but rather impact an individual's relationships with others which can lead to conflict. These scales could be considered to represent constructs in their own right. In fact, the subscale that accounted for more variance than all the others combined was *social distrust/stereotypic characteristics* (renamed *paranoid/suspicious*) at 38%. Beliefs that are represented in this subscale appear to reflect paranoid ideation, often present within the context of personality disorder and mental illness, such as *you can't trust anyone*. These beliefs may represent perceptions of threat and poor social adjustment; therefore, it would seem reasonable that these beliefs may be associated with violence, even if this association is less obvious to the respondent than on other items.

Content Validity

Kline (1986) describes content validity as ensuring the items of a test can be shown to reflect all aspects of the subject being tested. In examining the items of the FAVT it is evident they are quite specific and it would be difficult to imagine they would cover the full range of

thoughts people experience that could increase the likelihood of violent behaviour. It would clearly be impossible to identify every thought ever associated with violence, as well as the sort of vocabulary that an individual might use to express this thought. However, the items can be used more as examples in order that individuals can report any thoughts that are reflected in the items. The items will never be exhaustive; rather the test aims to look for a thinking style that the authors have come across within their experience of 'voice therapy'. The scope of the measure could be broadened if instructions were given to participants to endorse statements that are similar to any thoughts they have experienced, although this may threaten the standardisation of the measure.

The FAVT was validated with a sample of individuals in custody, on parole, in outpatient psychiatric treatment, and a non-clinical sample, allowing for good generalisability with different populations. They were able to recruit a range of participants with and without violent behaviour, however there were no individuals reporting violence within the out-patient and non-clinical sample, which limits the ability of the FAVT to measure violent thoughts within these groups.

Construct Validity

The concept of the 'voice' appears to have a broad definition including any types of negative thoughts. It could therefore be argued that we all experience thoughts, making it a valid construct. However, the way individuals experience thoughts is difficult to compare as one cannot experience someone else's thoughts. Firestone (1988) describes it as though the voice is heard as if another person were speaking. The FAVT was validated with a sample of individuals in custody, on parole, in outpatient psychiatric treatment and a non-clinical sample. It could be suggested that these individuals may experience this voice in different ways. For example, a psychiatric outpatient may experience them as auditory hallucinations, whereas non-psychiatric patients may experience thoughts in the first person. Differences in the quality or format of the thoughts do not necessarily mean there will be a different impact on violent behaviour however.

The items in the FAVT were reviewed by two individuals trained in voice therapy with violent individuals. The items are therefore proposed as representative of statements that are commonly made by these clients. The individuals reviewing these items are reported to have had 92% agreement as to the validity of the items (Doucette-Gates et al., 1999). Although

the items were derived from the experience of voice therapy, they were not derived from interviews specifically designed to elicit this data. Doucette-Gates et al. (1999) have reported that this was not possible; therefore they were derived from interviews designed for the purpose of the therapy instead. This could serve to avoid possible demand characteristics present in interviews designed specifically for the purpose of identifying violent thoughts, and gives an ecological validity to the items, although may also have led to potential items being missed.

The hypothesis that violent cognitions will be linked to violent behaviour has been borne out in previous research (Grisso, Davis, Vesselinov, Appelbaum, & Monahan, 2000). Guerra et al. (2003) suggest aggressive cognitions normalise violence, therefore increasing the likelihood of violent behaviour. Huesmann and Eron (1984) suggest violent cognitions act like rehearsals of violent scripts which become more easily primed and more accessible as a behavioural response. However, the FAVT is based on 'separation theory', which was developed by Robert Firestone (1997) based on psychoanalytic and existential models. Separation theory aims to explain how early trauma leads to the development of defences. Negative attitudes held by parents or early caretakers towards themselves and their child which were potentially abusive are hypothesised to lead to internalised negative thought processes. The construct of the inner 'voice' is used to describe these internalised thought processes and is described by the authors of the FAVT as, "an integrated system of negative thoughts and attitudes, antithetical to self" (Firestone, 1997, p. 45). The concept of the 'voice' does not appear to be a widely accepted construct within psychology literature, however it could be compared with similar, more widely accepted constructs such as negative automatic thoughts, as described in cognitive behaviour therapy (Beck & Freeman, 1990). Similar to more mainstream cognitive principles, an individual's thoughts are seen as representative of how they perceive themselves, others, and the world. However, the 'voice' is conceptualised differently to the 'I' statements used in cognitive therapy or rational emotive therapy, as the voice is experienced in third person 'you' statements, and separation theory describes a division between the self and this critical inner voice. These systems are conceptualised as the 'self system' and the 'antiself system' (Firestone & Firestone, 2008). 'Voice therapy' is a treatment developed by one of the authors of the FAVT, Robert Firestone (1988), in addressing this division.

Concurrent Validity

Concurrent validity refers to how the outcome of the test compares to the outcome for that individual on a different test that purports to be measuring the same thing. However, Kline (1986) points out that if there is another validated test that measures the same construct well enough, this would seem to remove the need for a further test to be developed. Doucette-Gates et al. (1999) acknowledge there were no other measures related to this construct at the time the FAVT was developed. However, since this time the Maudsley Violence Questionnaire (MVQ) has been developed (Walker, 2005). The MVQ is based on a similar premise that certain thoughts, beliefs, and attitudes are associated with increased likelihood of violent behaviour (Walker, 2005). The MVQ was designed to, "evaluate individuals' thoughts and beliefs about violence, violent acts and beliefs about what is acceptable, justifiable and reasonable in various situations" (Walker, 2005, p. 188). Walker cites the FAVT as the only comparable measure to the MVQ in assessing thoughts associated with violence, and one of the authors of the FAVT, Robert Firestone, was asked to review the MVQ. However, Walker describes the MVQ as differing to the FAVT on the basis of the cognitive model, as the FAVT appears to measure negative automatic thoughts, whilst the MVQ works on the level of 'rules', such as *it is ok to hit someone if they make you look stupid* and core beliefs such as *I see myself as a violent person*. Firestone and Firestone (2008) suggest the FAVT items represent thoughts on all levels, including automatic thoughts, rules, assumptions, and core beliefs. Within the cognitive behavioural model (Beck & Freeman, 1990), the thoughts described in the FAVT would appear to result from the development of the sorts of rules and core beliefs described in the MVQ, suggesting that they are accessing different levels of the same construct. It would therefore seem appropriate to assess concurrent validity between the FAVT and the MVQ.

The MVQ was available during the later standardisation of the FAVT by Firestone and Firestone in 2008 and was administered to 148 of the incarcerated and anger management samples, a control sample of 27 members of the public, and a psychiatric control group of 30 (total n = 205). The FAVT correlated with the MVQ on all scales (0.18 – 0.48) other than the *self-aggrandising* scale, which did not correlate with the MVQ total score or *Machismo* Scale.

Other measures that correlated with the FAVT include the Trauma Symptom Inventory (TSI; Briere, 1995) and the Personality Assessment Inventory (PAI; Morey, 1991). In particular,

the theoretical scales and the *paranoid/suspicious* and *persecuted misfit* scales of the FAVT correlated with the *intrusive experiences, tension reduction behaviour,* and *defensive avoidance* scales of the TSI, and the *anxiety-related disorders* scale of the PAI which addresses trauma. Firestone and Firestone (2008) suggest this supports the view that the FAVT also assess the individual's history of trauma and the concept of the 'voice' represents the internalisation of trauma.

All elements of the FAVT also correlated with the Past Feelings and Acts of Violence scale (PFAV; Plutchik & van Praag, 1990) measuring occurrences of previous violence and anger, providing further evidence for the concept of violent thoughts, and the impact on emotions and violent behaviour. Further correlations were found with the Firestone Assessment of Self-Destructive Thoughts (FAST; Firestone & Firestone, 2006), and the Beck Hopelessness Scale (BHS; Beck, 1988).

The *self-aggrandising* scale correlated with the fewest of the other measures. The Blame Attribution Inventory (BAI; Gudjonsson & Singh, 1989) total score correlated with all other scales aside from *self-aggrandising,* although the scales of the BAI did not correlate consistently with the FAVT. The FAVT also correlated overall with the Inventory of Offender Risk, Needs and Strengths (IORNS; Miller, 2006), although there are many elements to this assessment and these correlated differently with the scales of the FAVT. The *self-aggrandising* scale did not correlate with the psychopathy index, or the static risk index, whilst all other FAVT scales did, and it correlated in the opposite direction to the other scales on the overall risk index, the inter-personal problems index, and the protective strength index. It was the only scale to positively correlate with the personal resources index. These results suggest that this scale is not assessing the same construct as the others in the FAVT.

A second validation sample was obtained from a prison population (n = 316) and another series of psychometrics were administered alongside the FAVT (Firestone & Firestone, 2008). These included the Rosenberg Self-Esteem Inventory (RSEI; Rosenberg, 1979), the Pride in Delinquency Scale (PDS; Shields & Whitehall, 1991), and the Paranoia/Suspiciousness Questionnaire (PSQ; Rawlings & Freeman, 1996). Negative correlations were found between the RSEI and the FAVT, and positive correlations were found between the PSQ scales and the FAVT, however again this excludes the *self-*

aggrandising scale. The PID correlated with the FAVT other than with the *persecuted misfit* scale.

Other tests available that may be similar to the FAVT could include the Psychological Inventory of Criminal Thinking Styles (PICTS; Walters, 1995). However, this is designed to assess generic offending behaviour rather than specifically violence. Walker (2005) highlights that those psychometrics that purport to measure thoughts associated with violence actually measure constructs that may mediate violence, such as anger, hostility, impulsivity and empathy, and although these may be linked to violence they do not measure the specific thoughts, beliefs, and attitudes which may principally relate to violence. However, this could also be argued with the subscales of the FAVT, which may represent constructs such as paranoia and negative self image. Other similar assessments that exist are designed for use with adolescents, such as the attitudes towards violence scale (Funk, Elliott, Urman, Flores, & Mock, 1999), although this has not been compared to any differentiating outcome such as different levels of reported violence (Walker, 2005).

Predictive Validity

The predictive validity of a test relates to how well the scores on the test predict a future outcome, such as the perpetration of violence. This can be done through correlations between outcomes over a period of time. In the FAVT, Doucette-Gates et al. (1999) have looked into whether an individual's score for experiencing violent cognitions relates to their later likelihood of violent behaviour. However, as the study was not longitudinal, they were not able to look at the future violent outcomes for the individuals they tested. Instead, they were able to look retrospectively at previous violence perpetrated by each individual. They found the level of violent cognitions reported by an individual correlated with whether they had previously perpetrated violence; therefore they were able to discriminate effectively between violent and non-violent individuals using their score on the FAVT. Using t-tests, they compared the different clinical and non-clinical sample groups in terms of their mean scores on the FAVT. Individuals in the non-clinical/non-violent group consistently scored lowest on the FAVT, and the parolee and incarcerated violent group scored significantly higher on the FAVT than other groups. None of the participants in the out-patient and non-clinical samples reported perpetrating violence, therefore comparisons could not be made. Doucette-Gates et al. (1999) also report effect sizes for the mean differences between groups, which ranged from 0.69 to 0.78. Recommendations regarding what is considered to be a large effect size

are given by Cohen (1992), who suggests that an effect size of 0.5 is considered moderate and 0.8 large.

Doucette-Gates et al. (1999) also reported a stepwise hierarchical logistic regression model using the initial four subscales of the FAVT, which also took into account the contribution of other potential factors associated with violence in the sample, to predict self-reported past violent behaviour. This included demographics, such as age group, education level, and ethnicity, as well as history of criminal convictions in one block. In the second block were scores on an assessment of 'self-destructive thoughts' ('FAST', Firestone & Firestone, 2006), and the FAVT subscales, with the outcome of violent behaviour. Factors in each block that were not significant were removed and this led to the exclusion of education level in the first block, and the FAST in the second block, as well as two of the FAVT scales: *negative thoughts about self and other (*renamed *self-depreciating/pseudo-independent*) and *overt aggression/anger* (renamed *overtly aggressive*). The exclusion of these two scales suggests they did not significantly contribute to predicting the outcome of self-reported past violent behaviour. This could present a challenge to their usefulness in the FAVT as a risk assessment. However, they did account for more than 16% of the variance within the factor analysis, suggesting they are representative of the construct, although again they explained the lowest amount of variance at 8.2 and 5.6 respectively. Intuitively it would seem more likely that the overt thoughts of aggression scale would be the most likely to be associated with violent behaviour, yet this scale was not significantly predictive in the model. However, it could be suggested that these items represent the least socially acceptable to endorse, therefore may be avoided by respondents. Of the remaining factors, the demographics explained 26% of the variance and the inclusion of the *social mistrust* subscale (renamed *paranoid/suspicious)* and *perceived disrespect* subscale (renamed *persecuted misfit*) increased this to 39%. This indicates 13% of the variance was explained by the two FAVT subscales, and 61% of the variance in the outcome of violent behaviour to be explained by other factors. This suggests that violent thoughts does not account for much of the violent behaviour reported.

Further stepwise logistic regressions were run by Firestone and Firestone (2008) with a different sample (n = 205) to predict whether an individual had reported behaving violently towards someone close to them, and secondly to predict whether an individual had been arrested. In both analyses, demographics and other measures were added to the model but

only ethnicity, educational attainment, and the total FAVT score contributed significantly to the model's ability to predict violence or arrest.

The hypothesis that violent thoughts contribute to violent behaviour has also been supported by Grisso et al. (2000), who demonstrated using a stepwise regression analysis that the presence of violent thoughts as measured by the Schedule of Imagined Violence (SIV) explained an additional amount of variance to the outcome of violent behaviour, after controlling for variables commonly associated with aggression such as anger, impulsiveness and psychopathy. Although this measure related to violent thoughts in the format of images.

The sensitivity and specificity of an assessment can be considered by calculating the number of true positives against the number of positive classifications and the number of true negatives against the number of negative classifications in order to consider the error rate of false positives and false negatives. Receiver operating characteristics (ROC) analysis can be used to plot these and provides an Area Under the Curve statistic (AUC). Any AUC statistic above 0.5 represents a better than chance classification, and Swets (1988) suggests AUC values above 0.7 represent useful accuracies. The sensitivity and specificity of the FAVT in predicting violent behaviour was assessed through ROC analyses. A ROC analysis was reported by Doucette-Gates et al. (1999) with the pilot sample, which indicated within the regression model there was an 82% probability that a randomly selected violent participant would have a higher score than a randomly selected non-violent participant.

A later ROC analysis by Firestone and Firestone (2008; n = 1009) demonstrated that the total FAVT score could distinguish between those in treatment for anger management and those who were not (AUC 0.73), whether individuals had a history of arrest or not (AUC 0.72), and those who reported being violent towards someone close to them and those who did not (AUC 0.71). ROC analyses were then applied using the subscale scores with the same groups and the *overtly aggressive* scale performed better than the FAVT total score in distinguishing between the groups, with AUC scores of 0.81, 0.77 and 0.74 respectively. The authors qualify these results by equating them to the AUC scores of other mainstream assessments such as the HCR-20. However, these results still indicate there is approximately a 30% chance that an individual would be wrongly classified (i.e., have a false positive score or a false negative score), therefore their proposal that it can be used to predict violence may lead to 30% errors.

What Doucette-Gates et al. (1999) are not able to determine is whether the violent behaviour occurred prior to or following the onset of violent cognitions. It could be suggested the perpetration of violence could trigger violent cognitions, rather than the cognitions preceding the violence. Similarly, the individual may not have experienced violent cognitions at the time of the violent behaviour, but at a much earlier time. Therefore, the timing of the assessment in relation to perpetration of violence appears to be an issue that was not addressed. It seems it is not clear whether the experience of violent thoughts is presented as an acute or stable risk factor. As an acute risk factor violent thoughts could be considered to impact behaviour at the time, whereas to be a stable risk factor there would need to be a consistent pattern of violent thoughts. The items are based on thoughts reported by individuals in therapy that occurred to them prior to and during an incident of violence which suggests they are an acute risk factor. Firestone and Firestone (2008) suggest these thoughts represent both static and dynamic risk factors for violence and describe the *types* of thoughts an individual experiences as a stable trait and the *intensity* of these thoughts as an acute, context dependent, state.

Conclusion

The construct of violent thoughts presents a particularly challenging one to measure. The breadth of the construct is not clear cut, therefore the FAVT could also be considered to measure a number of other constructs. Similarly, it would also seem impossible that the FAVT could be considered to represent all types of violent thoughts. Although factor analysis was used in the construction of the FAVT, the *self-aggrandising* scale was not developed through this process. This scale has also shown the weakest correlations and the weakest relationship to other measures relating to similar concepts, therefore this scale appears to be a weakness of the FAVT. Kline (1998) asserts that all factor structures must be replicated on other samples. A confirmatory factor analysis could be used to re-consider the inclusion of this scale. Otherwise, the FAVT appears to be a psychometrically sound tool so far and may be as close as psychologists have got to creating a tool that accesses the conscious cognitive processes of individuals who are behaving in a violent manner, although more research is required to further improve the evidence for its reliability, validity and factor structure. There have been no independent studies done on this measure.

The concept of the internal voice is described within a psychoanalytic and existential framework. The accessibility of the FAVT to psychologists could potentially be improved by relating it to the more common concepts used within cognitive behavioural therapy. This could provide a particularly useful tool for psychologists working within a cognitive behavioural approach in treatment with individuals displaying violent behaviour. Thoughts could be identified and addressed in therapy and the FAVT could be applied as a pre and post measure. Doucette-Gates et al.'s (1999) claim that it can provide a tool for screening to prevent the perpetration of violence is ethically questionable as it could still lead to potential false positives or false negatives for approximately 30% of individuals assessed; therefore, it would require further research to establish this claim. The sensitivity of the tool and the predictive power are satisfactory, but still leave room for error.

The FAVT was developed on a male only sample and yet females have been included in the standardisation of the tool. Doucette-Gates et al. (1999) have proposed the recruitment of more female participants may allow exploration of the use of the FAVT in a female population. The FAVT has already been developed with adolescents (FAVT-A). There could also be further validation of the tool with learning disabled and inpatient psychiatric populations. This could help to increase the generalisability of the FAVT further, as well as providing further evidence for the properties of the measure.

The FAVT appears to illustrate a cognitive route into the perpetration of violence that fits with cognitive models of aggression described in Chapter One. The cognitions represented in the FAVT could be generated due to aggressive normative beliefs, anger, and hostile attribution bias, as well as aggressive cognitive scripts of how social interactions are played out. Doucette-Gates et al. (1999) hypothesise that the violent thoughts measured by the FAVT may develop as a result of trauma. This hypothesis is further explored in the following chapter which details the use of FAVT in a study into violent cognitions in post-traumatic stress disorder, and the relationship with violent behaviour.

Chapter Four

Violent Cognitions in PTSD

A Research Study into the Prevalence of Violent Cognitions in Veterans with PTSD and the Impact on Violent Behaviour

Abstract

There is a well established relationship between PTSD and the perpetration of violent behaviour (see Chapter Two). This study aimed to investigate violent cognitions as a potential mediator between PTSD and violent behaviour. Participants were veterans receiving inpatient treatment at a Combat Stress unit for trauma related anxiety disorders, as well as a control group of veterans not diagnosed with PTSD. Two measures were used to assess two different types of violent cognitions, the Firestone Assessment of Violent Thoughts (FAVT) and the Schedule of Imagined Violence (SIV). Logistic regression analysis revealed a main effect of PTSD on violence, a main effect of PTSD on level of violent cognitions, and a main effect of violent cognitions on violent behaviour. Violent fantasy measured by the SIV mediated the relationship between PTSD and violence. This fits with cognitive theories of PTSD, highlighting the impact of trauma on beliefs about the world, self, and others, and changes in information processing following trauma. It also supports the role of violent cognitions and rehearsal of violent scripts in the perpetration of violent behaviour. However, in the final mediation regression model the violent thoughts measured by the FAVT did not explain a sufficient amount of the variance as a mediator between PTSD and violence. Thus, there appear to be a number of others factors mediating this relationship that need to be accounted for.

Introduction

Research has established a relationship between suffering Post-Traumatic Stress Disorder (PTSD) and the perpetration of violence (e.g., Parrott et al., 2003). However, what mediates this relationship is still being explored. PTSD symptoms include increased levels of arousal (Pitman et al., 1987) and anger (Novaco & Chemtob, 2002), which primes perception of threat (Barazzone, & Davey, 2009). Cognitive theories of PTSD also suggest violence may relate to an increased interpretation of threat in the environment (Chemtob et al., 1988).

In considering the symptoms of PTSD in relation to violent behaviour, cognitive theories of aggression suggest violent behaviour can result from the rehearsal of cognitive scripts involving violence (Huesmann, 1988). These scripts are developed through witnessing and experiencing violence, as well as perpetrating violent acts (Huesmann, 1988; Ireland, 2009). The rehearsal of violent scripts could then occur through violent imagery and thoughts (Huesmann & Eron, 1984), triggered particularly where the individual is experiencing high levels of anger and arousal leading to interpretation of threat, such as with PTSD symptoms. Novaco and Chemtob (2002) found a relationship between levels of anger and increased violent cognitions. It is therefore hypothesised that violent thoughts and imagery could be a mediating factor between PTSD and violence.

There have been a number of studies conducted with children and adolescents supporting the relationship between aggressive fantasy and increased aggressive behaviour (see Smith et al., 2009, or see Carnagey & Anderson, 2004, for a review). However, few have been conducted with adults. One study by Greenwald and Harder (1997) found the content of adults' fantasies was associated with the resulting behaviour. They looked at various fantasised coping strategies and those coping strategies that were utilised by the individual in reality and found that they correlated. For example, they found that those that fantasised about power and revenge used anger as a coping strategy.

However, it can be difficult to obtain information relating to individuals' private cognitive experiences, particularly for those who suffer with mental health disorders. Yet it is an important undertaking as some of their mental experiences may affect the likelihood that they will commit an offence. The MacArthur study found a link between violent fantasy and perpetration of violence in individuals with mental disorder, amongst other risk factors

(Monahan et al., 2001). As part of this research, Grisso et al. (2000) developed the Schedule of Imagined Violence (SIV), which investigated the individual's experience of violent fantasy. The instrument consists of, "a structured set of eight questions with coded response categories" (Grisso et al. 2000, p. 390). Specifically, the questions inquire about the recency, frequency, and chronicity of self-reported violent fantasy, as well as the similarity/diversity in type of harm imagined, whether the target is focused or more generalised, whether the seriousness of harm changes over time, and the proximity of the individual to the target of his or her violent thoughts (Grisso et al. 2000).

Grisso et al. (2000) examined self-reported violent thoughts in mental health patients using the SIV and compared them to a non-patient control sample. They also investigated whether the level of violent thoughts reported was related to the number of violent acts perpetrated within 20 weeks of being discharged from hospital, and whether the violent thoughts continued post-discharge. Violence was defined as, "battery that resulted in physical injury, sexual assaults, assaultive acts that involved the use of a weapon, or threats made with a weapon in hand" (p. 390). Twice as many patients reported experiencing violent thoughts (one third) compared to non-patients. Reporting violent thoughts in hospital was significantly related to the perpetration of violence after discharge for non-white patients, patients without major mental disorder but with substance abuse diagnoses, patients with high symptom severity, and patients whose reports of violent thoughts persisted after discharge. Grisso et al. (2000) suggest their findings are consistent with the social cognitive model which proposes that the more schemata and scripts are rehearsed, the more likely they are to be accessed in future (Polaschek, Calvert & Gannon, 2009). They also found that the more severe the patient's symptoms, the more likely they were to report violent thoughts. Grisso et al. (2000) suggest the higher levels of stress associated with more severe symptoms may restrict the individual's access to less frequently rehearsed cognitive scripts that they may otherwise have applied, increasing the likelihood that the individual automatically resorts to frequently rehearsed scripts involving harm to others in responding to threatening situations. Grisso et al. (2000) also found anger correlated with the level of violent thoughts, although it could not be determined whether anger precedes, or results from violent thoughts. Both violent thoughts and anger accounted for the variance in violent behaviour.

Similar to the SIV, the Firestone Assessment of Violent Thoughts (FAVT, Doucette-Gates, Firestone & Firestone, 1999; described in detail in Chapter Three) was designed to predict

violent thoughts that may lead to violent behaviour. The FAVT has been shown to distinguish between violent and non-violent individuals based on the premise that the thought processes people experience strongly influence their behaviour. These cognitions and thought processes are referred to by the authors as the internal 'voice'. Doucette-Gates et al. (1999) recommend further research using the FAVT to look at violence on a continuum rather than as a dichotomous concept. They also recommend further research around traumatic experiences and the impact on thoughts such as those identified in the FAVT. Therefore, the current research aims to explore the impact of trauma on violent cognitions, including violent thoughts and violent fantasy, and the impact of violent cognitions on violent behaviour.

Aims

This study aims to consider the mediating role of violent cognitions between PTSD and violence.

Objectives

The objectives are:

1. To provide evidence for the relationship between PTSD and violent behaviour. It is hypothesised that the PTSD group self-report more incidents of violent behaviour.
2. To examine whether there is a relationship between PTSD and SIV status. It is hypothesised that significantly more participants in the PTSD group report imagined violence on the SIV than in the control group.
3. To examine whether there is a relationship between SIV status and violent behaviour. It is hypothesised that participants who report imagined violence on the SIV report more violent behaviour.
4. To examine whether there is a relationship between PTSD and scores on the FAVT. It is hypothesised that the PTSD group score significantly higher on the FAVT than the control group.
5. To examine whether there is a relationship between scores on the FAVT and violent behaviour. It is hypothesised that the higher a participants' score on the FAVT, the more likely they report violent behaviour, and the more violent behaviour they report.
6. To examine the relationship between PTSD, violent cognitions in the form of thoughts and images (as measured by the SIV and FAVT) and violent behaviour. It is

hypothesised that violent cognitions mediate the relationship between PTSD and violence.

Self-report measures of violent cognitions will be administered to individuals with a diagnosis of combat related PTSD, within a residential unit for ex-service personnel with PTSD and trauma related anxiety disorders, as well as to a control group of serving and ex-service personnel in the community without a diagnosis of PTSD. The SIV will be used to look at violent fantasy, and violent thoughts will be investigated using the FAVT. Acts of violence must meet the criteria for a criminal charge and meet the definition of violence detailed below.

Method

Ethics

The study has been approved by the Science, Technology, Mathematics and Engineering Ethical Review Committee at the University of Birmingham, as well as by the ethical committee at Combat Stress. All participants were fully informed of the purpose of the research and signed a consent form if they decided to take part. The information participants provided was anonymous, however they allocated their data a number known only to themselves, should they wish to identify and withdraw their data. The resident psychologist at Combat Stress was present during all interviews.

Participants

A priori power analysis was conducted to consider how many participants would be required in order to achieve adequate statistical power. This was calculated on the basis that the statistical analysis used would be multiple linear regression. Assuming an effect size of 0.3 with two predictor variables, a total sample of 38 would be required. Field (2005) suggests that as a 'rule of thumb' 15 cases are required per predictor variable. Given that the predictors in this study are PTSD status, level of violent thoughts, and level of violent fantasy, this would indicate 45 cases are required. Green (1991) puts forward two rules for calculating the number of participants required, firstly that a baseline of 50 participants is added to the number of predictors multiplied by 8. This would indicate 74 participants would be required. Secondly, Green suggests that a baseline of 104 participants should be added to the number of predictors, equalling 107 participants.

Combat Stress is an independent organisation for ex-service personnel suffering from trauma-related mental health disorders. Their client group mainly consists of men ranging from age 19 to 95 years old, although they also treat female clients, currently approximately 3-6% of the service users. Clinical staff at Combat Stress have reported many of their population have disclosed being involved in some form of violent behaviour. This includes domestic violence, seeking violent interactions for the 'buzz', and responses to perceiving constant threats in their environment. They also report alcohol is consistently reported to act as a disinhibitor to violence. Of the referrals to Combat Stress, 13-15% come from the NHS and GPs; 30% are from ex-service charities; and over 50% are self or family referrals. Combat Stress reported they received 1,400 new referrals in 2011, which represents an increase of 66% over four years. This included more than 500 veterans from the second Iraq war and over 160 from Afghanistan. They report 82% of Combat Stress clients are soldiers; 7% are airmen; 1% are marines; and the remaining percentage are sailors. The majority have served for around 11 years. They report they rarely see veterans who were discharged from service for psychiatric reasons (information reported to The Howard League, 2011).

Participants from Combat Stress were recruited over a period of two months in October and November 2011. They were all male, ex-serving, with an average age of 47 years (*SD* = 12), ranging from 28 to 82 years. Control participants were recruited in the community over four months from November 2011 to February 2012, through contacting The Royal British Legion and private security companies in Afghanistan, as well as advertising in the community and by word of mouth. The control group matched those from Combat Stress as far as possible in that they were all male, ex-serving, non-commissioned ranks, other than two currently serving officers and one ex-serving officer. The data for the currently serving participants could not be removed to match the groups as the data was anonymous. Control participants had an average age of 42.5 years (*SD* = 14.5), ranging from 27 to 83 years. Individuals from both groups served in a range of conflicts, including the Second World War, Northern Ireland, Iraq, and Afghanistan.

Measures

Violent cognitions are measured using two assessments which identify both violent thoughts and violent imagery. The FAVT is an assessment of thoughts related to violent behaviour and is explained fully in Chapter Three. The Schedule of Imagined Violence (SIV) was developed by Grisso et al. (2000) to measure the individual's experience of violent fantasy as

part of the MacArthur study (Monahan et al., 2001). It is formed of eight questions about whether the individual has ever experienced violent fantasies, and the recency, frequency, and chronicity of these fantasies, as well as the similarity/diversity in type of harm imagined, whether the target is focused or more generalised, whether the seriousness of harm changes over time, and the proximity of the individual to the target of his or her violent thoughts (Grisso et al. 2000). The results are coded on whether the individual does report violent fantasies (SIV positive) or does not report such fantasies (SIV negative), and provides qualitative information about these fantasies.

The SIV and FAVT are both validated psychometrics that have been normed on a psychiatric and offending population. They have been standardised and no changes were made to these measures. However, it was identified in Chapter Three that there may be room for differing interpretations of some of the FAVT items, or some generalising of the item to include similar thoughts. Therefore, the researcher was present to provide clarification and offered to administer the assessment in order to assist with any literacy problems.

Procedures

When the researcher administered the measures, the participants recorded their own answers. Responses on the FAVT are given on a three point Likert scale as to how often the participant experiences each item. The SIV response options differ for each question. It was also identified in Chapter Three that individuals may experience thoughts in different ways, and it is not possible to experience someone else's thoughts. For example, psychiatric patients may experience violent thoughts as the voices of others, whereas non-clinical participants will be more likely to experience them in the first person. This difference in the quality or format of the thoughts may apply to PTSD patients, as PTSD patients often report hearing 'voices' or re-experiencing symptoms. However, this difference in quality or format of the violent thoughts may not necessarily alter the impact on violent behaviour, and violent cognitions in the form of symptoms were not discounted.

Rates of violence were recorded by the participant as a tally of how many acts they have perpetrated which meet the definition of violence given. The World Health Organisation definition of violence is, "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or

deprivation" (Krug, Mercy, Dahlberg, & Zwi, 2002, p. 1084). This definition includes violence towards oneself however, and uses language that may not be easily comprehended. The MacArthur study used the definition, "battery that resulted in physical injury, sexual assaults, assaultive acts that involved the use of a weapon, or threats made with a weapon in hand" (Steadman et al., 1998, p. 395). The inclusion of sexual assault may implicate sexual assault for the purposes of violence but may also include assault for the purposes of sexual gratification only. The definition used by Webster et al. (1997), "actual, attempted, or threatened harm to a person or persons" (p. 24), is considered simpler, as well as flexible in its inclusion of a wide range of behaviours, including threatened violence. This definition was put to participants following a single question on the form: "How many times as an adult (over 18) have you behaved in a way that could be considered violent towards another person according to this definition? Please include behaviour which led to a conviction or could have led to you being convicted if it was reported, even if you were not, and even if you felt it was justified. Please do not include violence that occurred in the line of duty". Participants were also able to discuss this definition with the researcher if they were unsure, but were reminded that if they disclosed the specific details of an offence the researcher would be obliged to inform their care team who would manage it under their existing policies.

Analysis

The data were a mix of categorical and continuous formats. Frequencies and relationships between the categorical data were examined using chi square analysis. The data met the assumptions for chi square as the expected frequencies were all above 5. Relationships between the continuous data were examined using correlations, and point-biserial correlations were used where there was a mixture of categorical and continuous data. The aim of the study was to consider the mediating role of violent cognitions between PTSD and violence. Baron and Kenny (1986) provide guidelines for analysis of a mediation hypothesis. Three regressions are applied. Regression of the mediator on the independent variable (SIV on PTSD, and FAVT on PTSD) and regression of the dependent variable on the independent variable (violence on PTSD) are required to reach significance in order to perform the final mediation analysis of regression of the dependent variable on both the independent variable and the mediator (violence on both PTSD and violent cognitions). When entering the mediator in the model with the independent variable and the dependent variable, the impact of the independent variable on the dependent variable should be reduced if the mediator is accounting for part of this relationship. The significance of the mediator can be tested using

Sobel (Baron & Kenny, 1986), however this assumes normal distribution. Bootstrap resampling provides confidence intervals which do not rely on normal distribution.

Data Description

A Cook's distance analysis revealed that an outlier in the violence measure was having undue influence on the results (Cooks distance above one); therefore, this was reduced to equal the next highest data point as recommended by Tabachnick and Fidell (2001). Both the FAVT score and violence scores were not normally distributed, as they were both skewed towards the minimum. The data violated the assumptions for linear regression due to problems with multi-collinearity and non-normally distributed residuals. Therefore, the violence measure data was converted to categorical data, categorised into non-violent individuals (one incident or less), and violent individuals who had perpetrated repeated violence (more than one incident). This division was considered appropriate as it seems unrepresentative to label someone as violent on the basis of one incident. Having divided the participants in this way, logistic regression could be used as this is appropriate with categorical dependent variables and allows for both categorical and continuous independent variables. However, it is noted that when the continuous violence variable was entered into linear regressions, this produced the same results as the categorical violence variable in logistic regression.

Sample Description

There were 30 control participants and 28 PTSD participants recruited, however one participant in each category did not respond to the violence measure, therefore one participant in each group was excluded, leaving 29 control participants and 27 PTSD participants. Table 5 provides descriptive statistics of the differences between the groups. The control group reported a mean number of incidents of violence of 5.07 (*SD* = 9.4) with 14 reporting they had been violent once or never (48.3%), and 15 reporting they had been violent on more than one occasion (51.7%). The control group had a mean FAVT score of 87.97 (*SD* = 18.4), 19 were SIV negative (65.5%) and 10 were SIV positive (34.5%). The PTSD group had a mean number of incidents of violence of 24.7 (*SD* = 38.9) with three reporting they had been violent once or never, (11.1%), and 24 reporting they had been violent on more than one occasion (88.9%). The PTSD group had a mean FAVT score of 144.1 (*SD* = 24.8), four were SIV negative (14.8%) and 23 were SIV positive (85.2%).

Table 5

PTSD versus Control Group Frequencies

	N	SIV+ (%)	SIV- (%)	FAVT mean (SD)	Violence mean (SD)	Violent (%)	Not violent (%)
PTSD group	27	23 (85.2%)	4 (14.8%)	144.1 (24.8)	24.7 (38.9)	24 (88.9%)	3 (11.1%)
Control group	29	10 (34.5%)	19 (65.5%)	88.0 (18.4)	5.1 (9.4)	15 (51.7%)	14 (48.3%)

Results

Hypothesis 1. To provide evidence for the relationship between PTSD and violent behaviour. It was hypothesised that the PTSD group self-report more incidents of violent behaviour.

The results of a chi square analysis revealed a significant difference between the control group and PTSD group on violence status ($\chi^2(1, N = 56) = 9.14,\ p = 0.003$). Table 6 shows chi square associations between PTSD group and violence status. The odds ratio calculated indicates the PTSD group are 7.5 times more likely to have been violent on more than one occasion than the No-PTSD group. The model correctly predicts PTSD and violence status for 68% of cases.

Table 6

Chi Square PTSD and Violence

	No violence	Violence
No-PTSD	14 (48.3%)	15 (51.7%)
PTSD	3 (11.1%)	24 (89.9%)

Hypothesis 2. To examine whether there is a relationship between PTSD and SIV status. It was hypothesised that significantly more participants in the PTSD group report imagined violence on the SIV than in the control group.

The results of a chi square analysis revealed a significant difference between the control group and PTSD group on SIV status ($\chi^2(1, N = 56) = 14.85, p < 0.0001$). Table 7 shows the chi square associations between PTSD and SIV status. The odds ratio calculated indicates the PTSD group were 10.9 times more likely to be SIV positive than the No-PTSD group. The model correctly predicts PTSD and SIV status for 75% of cases.

Table 7

Chi Square PTSD and SIV

	SIV -	**SIV +**
No-PTSD	19 (65.5%)	10 (34.5%)
PTSD	4 (14.8%)	23 (85.2%)

Hypothesis 3. To examine whether there is a relationship between SIV status and violent behaviour. It was hypothesised that participants who reported imagined violence on the SIV report more violent behaviour.

The results of a chi square analysis revealed a significant difference between the SIV positive and SIV negative groups on the dichotomous violence status measure (χ^2 (1, $N = 56$) = 17.19, $p < 0.0001$). Table 8 shows chi square associations between SIV status and violence status. The odds ratio calculated indicates the SIV positive participants are 15.6 times more likely to have been violent than the SIV negative participants. The model correctly predicts SIV and violence status for 75% of cases.

Table 8

Chi Square SIV and Violence

	No violence	**Violence**
SIV -	14 (60.9%)	9 (39.1%)
SIV +	3 (9.1%)	30 (90.9%)

Hypothesis 4. To examine whether there is a relationship between PTSD and scores on the FAVT. It was hypothesised that the PTSD group score significantly higher on the FAVT than the control group.

A point-biserial correlation between PTSD status and FAVT score was significant ($p < 0.001$, $r = 0.796$).

Hypothesis 5. To examine whether there is a relationship between scores on the FAVT and violent behaviour. It was hypothesised that the higher a participant's score on the FAVT, the more likely they report violent behaviour, and the more violent behaviour they report.

A point-biserial correlation between violence status and FAVT score was significant ($p = 0.001$, $r = 0.431$).

Correlations were performed with the continuous data, between the FAVT scores and the number of times participants reported being violent. The Pearson's correlation was 0.32, a medium to large effect size which was significant ($p = 0.008$), showing that the more violent thoughts participants reported, the more violence they reported. All scales of the FAVT also correlated significantly with the number of violent incidents (R between 0.251 and 0.38, $p < 0.05$) except the self-depreciating/pseudo-independent scale (R = 0.22). The scale with the largest correlation with violence was the instrumental/proactive scale, and the scale with the smallest significant correlation was the self-aggrandising scale. See Table 9 for more details.

When entering the FAVT score into a regression model with the dichotomous violence status as the outcome, the FAVT significantly predicted whether the individual was persistently violent or not ($p = 0.003$). This model correctly predicted 73.2% of cases overall.

Table 9

Correlations between FAVT Scores and Number of Violent Incidents

	FAVT score	No of times violent	Paranoid suspicious	Persecuted misfit	Pseudo independent	Overtly aggressive	Self-aggrandising	Instrumental	Hostile
FAVT score	1	0.322**	0.954**	0.950**	0.962**	0.951**	0.610**	0.968**	0.964**
No of times violent		1	0.366**	0.288*	0.220	0.367**	0.251*	0.384**	0.227*
Paranoid suspicious			1	0.870**	0.874**	0.909**	0.537**	0.959**	0.893**
Persecuted misfit				1	0.907**	0.875**	0.510**	0.866**	0.959**
Pseudo independent					1	0.871**	0.601**	0.911**	0.936**
Overtly aggressive						1	0.544**	0.955**	0.914**
Self-aggrandising							1	0.614**	0.510**
Instrumental								1	0.895**
Hostile									1

*significant at 0.05 level, **significant at 0.01 level

Hypothesis 6. To examine the relationship between PTSD, violent cognitions in the form of thoughts and images (as measured by the SIV and FAVT) and violent behaviour. It was hypothesised that violent cognitions mediate the relationship between PTSD and violence.

The stages of mediation analysis were followed as suggested by Baron and Kenny (1986). Initially, a regression of the mediator on the independent variable (SIV on PTSD, and FAVT on PTSD) and regression of the dependent variable on the independent variable (violence on PTSD) are required to reach significance. Should these conditions be met, a final regression is performed of the dependent variable on both the independent variable and the mediator (violence on both PTSD and violent cognitions). When entering the mediator in the model with the independent variable and the dependent variable, the impact of the independent variable on the dependent variable should be reduced if the mediator is accounting for part of this relationship.

The first stage was regression of SIV status on PTSD, and FAVT score on PTSD, then regression of violence status on PTSD. The regression of SIV status on PTSD group was significant ($OR = 10.93$, $p < 0.0001$) as was the regression of FAVT score on PTSD ($\beta = 56.12$, $t = 9.65$, $p < 0.0001$). The regression of violence on PTSD was also significant ($OR = 7.47$, $p = 0.005$). Therefore, the conditions for mediation analysis were met and the independent variable (PTSD) and mediators (SIV status, FAVT score) could be entered into the model to predict the dependent variable (violence status) in a mediation analysis.

When all the predictors were entered into the model together, the associated chi square was significant ($p < 0.0001$) indicating the model improves the prediction of violence. The model correctly predicted the violence status of 78.6% of cases correctly overall. The contribution of PTSD was no longer significant when the mediators were entered into the model, only SIV status remained significant ($p = 0.015$). See Table 10 for the results of the mediation analysis. Therefore, the inclusion of SIV status in the model reduced the significance of PTSD in predicting violence, indicating the SIV contributes to this relationship. Although the significance of PTSD as a predictor also reduced when the FAVT score was entered, the FAVT score also did not remain a significant predictor, therefore the FAVT was removed from the model.

Table 10

Final Regression Model

	β	S.E	Wald	Sig	Expβ	95% CI for Exp β	
						lower	upper
PTSD group	1.003	1.191	0.710	0.400	2.726	0.264	28.117
FAVT	0.001	0.021	0.004	0.951	1.001	0.961	1.044
SIV	2.273	0.935	5.915	0.015*	9.712	1.555	60.660

*significant at 0.05 level, **significant at 0.01 level

This mediation analysis suggests that, although there is a direct relationship between PTSD and violent behaviour, part of this relationship is explained by violent fantasy. There is a mediating effect of violent fantasy on the relationship between PTSD and violent behaviour, as shown in Figure 2.

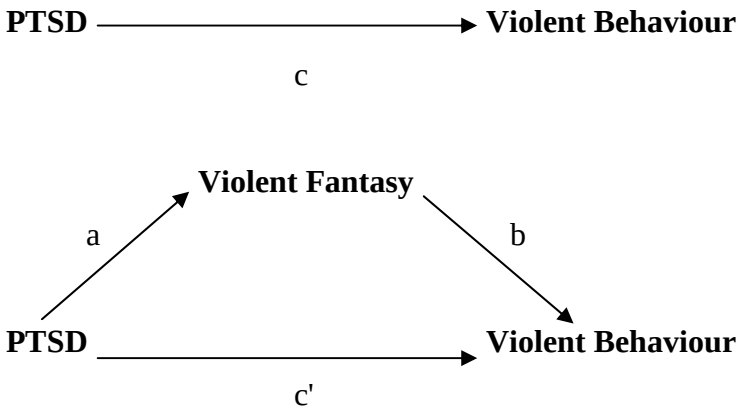

Figure 2: Mediation Model of PTSD, Violent Fantasy, and Violent Behaviour

In order to assess the significance of the impact of the mediator on the relationship between the predictor and the outcome, a Sobel test is recommended by Baron and Kenny (1986). However, Sobel does not account for mediation models with a dichotomous mediator. To address this, adjustments are suggested by Kenny (2008) which standardise the scales of the dichotomous variables to ensure they are comparable. These values are given in Table 11.

Table 11

Adjusted Mediation Coefficients

	β	S.E
comp a	0.55	0.15
comp b	0.42	0.15
comp c	0.49	0.17
comp c'	0.20	0.15

Preacher (2012) provides a Sobel calculator using the values of 'a' and 'b' and their standard deviations. Sobel tests the significance of the mediator in the relationship between the predictor and outcome. Using the adjusted values (comp a, comp b), the Sobel test shows the SIV was a significant mediator ($z = 2.25$, $p = 0.027$, $SE = 0.10$). Although caution is invited in using Sobel with small sample sizes due to problems with normal distribution, Mackinnon and Dwyer (1993) estimate that for a sample size of $n = 50$, the difference from the true value is within 3% with a binary independent variable. In addressing problems associated with non-normal distribution, bootstrapping analysis can be used, which does not rely on normal distribution as it uses bias-corrected confidence intervals (95%) (MacKinnon, Lockwood, & Williams, 2004). Bootstrap resampling (10,000 draws) produced confidence intervals of 0.31 to 1.59 for the estimated effect of the SIV. Although the confidence intervals suggest a lower estimate than the Sobel result, they support the conclusion that the SIV mediates the relationship between PTSD and violence. Mackinnon and Dwyer (1993) also provide equations to calculate the percentage of the relationship between the predictor and outcome which is accounted for by the mediator. Using the adjusted coefficient values for a, b, and c', violent fantasy accounts for 54% of the relationship between PTSD and violence.

Discussion

This study found further evidence for the relationship between PTSD and violent behaviour in a military veteran population. It also found preliminary evidence for a relationship between violent cognitions (violent thoughts and violent fantasies) and violent behaviour in this population. Findings indicate violent fantasy acts as a mediator for the relationship between PTSD and violent behaviour; however, the violent thoughts measured by the FAVT did not. The statistical power of the study may have been limited and there may be too many confounding variables impacting this relationship that were not accounted for.

Previous research has found a relationship between experiencing PTSD and an increase in the likelihood of perpetrating violent behaviour (e.g., Parrott et al., 2003). This study has provided further evidence of this relationship, and aimed to explore psychological processes that may have mediated this relationship. A relationship has previously been identified between violent cognitions in the form of thoughts and fantasies, and increased likelihood of perpetrating violence (Doucette-Gates et al., 1999; Grisso et al., 2000). Given that theories of PTSD suggest an impact of PTSD on cognitions, such as perception of threat and distrust of others, it was hypothesised that violent cognitions may mediate the relationship between PTSD and violence.

The measures selected to assess violent cognitions in the current study were standardised, reliable, and valid, and have previously been shown to discriminate violent and non-violent individuals. This study provided further evidence of the discriminative power of these measures as both predicted violent behaviour. The authors of the FAVT recommended further research look for a relationship between the experience of trauma and the violent thoughts measured by the FAVT. This study found such a relationship, supporting their suggestion, and a relationship was also found between PTSD and violent fantasy as measured by the SIV. This indicates there may be an impact of PTSD on cognitions as discussed in cognitive theories of PTSD such as the Ehlers and Clarke model (2000). Individuals with PTSD are more prone to interpreting situations as threatening according to Chemtob et al. (1988). The accessibility of the behavioural response or 'script' is likely to be influenced by the interpretation of a situation as threatening (Huesmann, 1988), and the interpretation of the situation as threatening is influenced by the cognitions and emotions triggered by the situation, including anger (Novaco & Chemtob, 2002).

Despite the relationships between PTSD and violent cognitions, and between violent cognitions and violent behaviour, this study found only partial evidence in support of the hypothesis that violent cognitions mediate the relationship between PTSD and violence. Violent fantasy mediated the relationship between PTSD and violence, however violent thoughts did not. Violent fantasies may act as a rehearsal of violent scripts, therefore increasing their accessibility (Huesmann, 1988). This relationship was found in previous research only when individuals had also witnessed violence (Guerra et al., 2003; Smith et al., 2009). Therefore individuals who have PTSD as a result of witnessing violence may be prone to this effect.

There were limitations to the research design that may have reduced the sensitivity of the research to the impact of the violent thoughts as a mediator. These are explored further and recommendations for future research are considered.

Limitations

There are many potential confounding variables which may have accounted for the variance between the two groups, despite them being matched on gender, rank, and ex-serving status. The conflicts in which participants served was not accounted for, although Teten et al. (2010) found no differences in the effect of PTSD on partner violence between veterans from different conflicts. It was also not possible to account for the impact of demographics such as education and socio-economic group, which have been found to partially account for the relationship between PTSD and violence in previous studies (see Chapter Two). However, obtaining this information may have threatened the anonymity of the participants and may have discouraged them from being honest in their responses. This information could have been obtained separately in order to maintain the anonymity of participants. This would still preclude the analysis of demographics as confounding variables but could have identified if there were any discrepancies between the groups.

Alcohol misuse was not accounted for in the current research and was highlighted by Combat Stress as being a commonly reported problem for patients. There is an established relationship between alcohol misuse and violence in previous literature (Taft et al., 2007a). However, previous research into the role of alcohol misuse as a mediator between PTSD and violence is inconclusive (see Chapter Two). This relationship could have been explored further by including a measure of alcohol misuse in the design.

It is possible that the background variables that increase an individual's risk of PTSD may be similar to those that increase the risk of violent behaviour, and the violence may have predated the trauma. The measure of violence did not discriminate between acts of violence before or after the trauma as the same measure needed to be administered to both groups. Therefore, a temporal relationship cannot be established using the current design. The violence measure also proved to be unsuitable for some participants who found it difficult to estimate the number of violent incidents they had been involved in. It resulted in data that was not normally distributed, with a number of outliers. Therefore, the violence measure data was categorised which results in a loss of information. An alternative violence measure

could have been used such as the Conflict Tactics Scale (CTS), which provides a survey of intimate partner violence over the past year; however, this would have limited the type of violence assessed to intimate partner violence, and the time period to 12 months, which may have resulted in a nil return.

The research design did not account for PTSD participants' stage of treatment. Some commented that their answers may have been different prior to starting treatment. The selection of participants was opportunistic and time limited, reducing the generalisability of the research and potentially introducing a bias. It is possible the participants who volunteered for the research were those who had problems with anger or violence, therefore identifying with the aims of the research. However, participants had a range of experience in different conflicts and spanned a wide age range, broadening the applicability of the findings to a wide population.

The measures used rely on self-report, which can be impacted by inaccurate recall and social desirability. The latter was minimised by ensuring the data was anonymous. There was no measure used to assess PTSD. The PTSD group had received a diagnosis verified by Combat Stress, however the control group were not assessed for PTSD. Participants were asked not to participate in the control group if they had received a diagnosis of PTSD, however their non-PTSD status was not verified. It is possible participants in the control group may have experienced PTSD symptoms but had not received a diagnosis. A screening assessment for PTSD such as the Trauma Symptom Inventory (TSI, Briere, 1995) could have been administered to the control group to rule out possible PTSD.

The sample size may also have impacted the results of the study. The initial power analysis was calculated for linear regression. A power analysis was calculated for logistic regression using GPower. Assuming a large odds ratio of 2.5 (Avery, 2011) and a medium correlation between PTSD and the mediators (0.3), 77 participants would be required to achieve 80% power. Peduzzi, Concato, Kemper, Holford, and Feinstein (1996) provide a power analysis formula for calculating sample size in logistic regression, which indicates 63 participants would be required in the current study. However, Long (1997) suggests that the sample size should always be a minimum of 100 for logistic regression analysis. Therefore, a larger sample size may have been required to produce significant results when using logistic regression.

Despite the limitations of the design of the research, the results support the hypothesis that there is an impact of PTSD on violent thoughts and on violent behaviour, and violent thoughts increase the propensity for violent behaviour. There is also evidence that violent fantasy mediates the relationship between PTSD and violence. However, there appear to be other variables that also impact these relationships.

Future research

There is potential for the impact of PTSD on cognitions to be investigated further as a mediator of violent behaviour, whilst controlling for other variables. The current study could be replicated using a larger sample size and accounting for more of the predictors identified in the research. Other potentially relevant types of cognitions could also be assessed, such as post-traumatic cognitions or criminal thinking styles. The Post-Traumatic Cognitions Inventory (PTCI, Foa et al., 1999) assesses cognitions associated with PTSD, and some of these may be related to violence.

The Psychology department at HMP Grendon are currently conducting their own research into PTSD and criminal behaviour. This will be done with a larger sample size than the current study and a mix of ex-military and civilian participants, controlling for a number of other variables. This study may therefore be more generalisable, and may also identify therapeutic communities as a suitable treatment for offending behaviour in individuals with PTSD.

Conclusions

This study provides preliminary evidence for a contribution of violent fantasy in mediating the relationship between PTSD and violent behaviour. This violent fantasy is likely to result from changes in cognitions as a result of PTSD and may act as a form of rehearsal of violent behavioural scripts. Although a relationship was also found between PTSD and violent thoughts, and violent thoughts and persistent violence, violent thoughts were not identified as a mediator in the relationship between PTSD and violence. This may be due to the number of other potential mediators which were not accounted for, or poor statistical power.

Chapter Five: Discussion

Overview

Psychologists often refer to an offender's history of trauma in assessing their pathway to violence. This thesis aimed to explore the relationship between responses to trauma and perpetrating violence. Research has established a relationship between Post-Traumatic Stress Disorder (PTSD) and violent behaviour (Collins & Bailey, 1990; Jakupcak & Tull, 2005; Parrott et al., 2003); therefore, the aim of this thesis was to investigate what mediates this relationship. Potentially relevant theories were explored such as the 'survival mode' theory of PTSD (Chemtob et al., 1997) and the General Aggression Model (GAM, Anderson & Bushman, 2002). In particular, the focus of the thesis has been on military populations due the risk of PTSD as a result of active service, and concerns about the numbers of veterans in the criminal justice system. A systematic review of previous research on mediators of PTSD and violence in military populations has highlighted factors such as demographics and combat exposure. However, there appears to be a lack of psychological processes identified in this research that could explain this relationship. Therefore, based on the theories of PTSD and violence, it was proposed that violent cognitions may act as a mediator. To measure these violent cognitions, the Schedule of Imagined Violence (SIV) and Firestone Assessment of Violent Thoughts (FAVT) were identified, and the psychometric properties of the FAVT were examined. A research study was designed to assess the contribution of violent cognitions in mediating the relationship between PTSD and violence using the FAVT and SIV in a mediation analysis. The results of this study found further evidence for the relationship between PTSD and violence, and a direct relationship was found between PTSD and violent cognitions, and between violent cognitions and violent behaviour. In the final mediation analysis, only the SIV was a significant mediator, indicating violent fantasy contributes to the relationship between PTSD and violence. The FAVT did not remain significant as a mediator. There are other factors mediating the relationship between PTSD and violence that were not accounted for which may have impacted the findings.

Contextualised Findings

A number of factors that mediate PTSD and violence have been identified in Chapter Two. These include: demographics, such as socio-economic group (Beckham et al., 1997; Begić & Jokić-Begić, 2001), age (Beckham et al., 1997; Beckham et al., 1998; Jakupcak et al., 2007; Sherman et al., 2006), and level of education (Begić & Jokić-Begić, 2001); mental health

factors, such as inpatient status (McFall et al., 1999) and co-morbid depression (Sherman et al., 2006; Taft et al., 2007c; Taft et al., 2009); military factors, such as level of combat exposure (Byrne & Riggs, 1996; Jakupcak et al., 2007; Taft et al., 2005; Taft et al., 2007a; Taft et al., 2007c; Taft et al., 2009), and witnessing atrocities (Beckham et al., 1998; McFall et al., 1999; Taft et al., 2005); situational factors, such as relationship problems (Byrne & Riggs, 1996; Taft et al., 2005; Teten et al., 2010), and alcohol misuse (Begić & Jokić- Begić, 2001; Taft et al., 2007a); and finally anger (Jakupcak et al., 2007; Taft et al., 2007b). In considering the temporal relationships of these risk factors to violence and their association with trauma, some factors, such as the demographics, would be present prior to and independent from the experience of combat trauma. However, the military factors, such as combat exposure and witnessing atrocities, are likely to be directly related to the experience of trauma. Similarly, co-morbid depression and inpatient status may be directly associated with the trauma, and the risk of violence was found to be related to the severity of symptoms, with more severe symptoms or additional psychiatric disorder increasing the risk.

Relationship problems could represent a static risk factor for future violence; however, given that the most common form of violence perpetrated by military personnel is intimate partner violence, relationship problems are also likely to represent an acute risk factor for this type of violence. Anger is also likely to be an acute risk factor for violence and is recognised as a symptom of PTSD. Alcohol misuse has been associated with both trauma and violence, and may act as an acute risk factor in disinhibiting the individual's emotional and behavioural responses.

Many of these factors reflect general risk factors for violence found in the civilian population. For example, 'relationship problems' is a risk item on the HCR-20 violence risk assessment protocol (Webster, 1997), and age is a risk factor on actuarial violence risk assessment protocols such as the Violence Risk Assessment Guide (VRAG, Quinsey, Harris, Rice, & Cormier, 2006). One factor that may represent a unique pathway for veterans is exposure to combat and atrocities. According to Guerra et al. (2003) and Smith et al. (2009), violent fantasy only increases risk of violent behaviour when the individual has also witnessed violence. For military populations, combat exposure implies the individual has witnessed violence; therefore, this may represent an important mediator of violent behaviour associated with violent cognitions. The role of combat exposure was also mediated by PTSD.

Of all the PTSD symptoms, hyperarousal in particular has been found to be associated with violence (Taft et al., 2007a; Taft et al., 2009). Chemtob et al. (1997) suggest this arousal can be activated by trauma cues and interpreted as anger. This arousal, alongside hypervigilance to threat, may invoke a 'survival mode' of cognitive processing, including a hostile attribution bias and selective attention to information that confirms a threat (Chemtob et al., 1988). This is likely to lead to problems regulating arousal due to cognitive resources being absorbed by the perception of threat, increasing the likelihood of impulsive responding. Previous association of anger and threat with scripts of violent behaviour is likely to make these scripts more accessible, therefore more likely to be selected (Huesmann, 1988).

The General Aggression Model (Anderson & Bushman, 2002) also takes account of the situational factors, predisposing factors, and the cognitive, affective, and arousal states that act as routes into violence, and the appraisal and decision making processes that lead to violent action. For individuals with combat related PTSD, situational factors may include trauma related cues, relationship conflict and alcohol use. Their predisposing factors could include demographics, combat exposure and resulting PTSD symptoms, which produce cognitive, affective, and arousal routes into aggression in the form of post-traumatic cognitions, anger, and hyperarousal. Their appraisal and decision making processes are then impacted by hypervigilance and perception of threat, alongside confirmatory bias and reduced cognitive resources for alternative appraisals or script selection.

Cognitions form an important part of these theories as they influence levels of anger and appraisals and decision making, as well as the accessibility of a violent script. In the current study, two types of violent thoughts that may form part of these violence models were measured by the FAVT and SIV. The FAVT represents the types of cognitions that may influence anger and provide justification for aggression, as well as increase the likelihood that situations may be perceived as threatening. The SIV measures the types of cognitions that lead to rehearsal, normalisation, and priming of violent scripts. Both of these types of violent cognitions have been found to distinguish between violent and non-violent individuals (Doucette-Gates et al., 1999; Firestone & Firestone, 2008; Grisso et al., 2000).

The properties of the FAVT appear to meet the recommendations for psychometric test development in the literature and have been shown to have reliability, validity, and discriminative ability for violent individuals as outlined in Chapter Three. The subscales of

the FAVT also correlated with violent behaviour, particularly the instrumental violence scale. The FAVT alone correctly predicted 73% of violent cases. However, data gathered from female participants was not included in the development of the items, potentially limiting is generalisability.

The self-aggrandising scale in the FAVT was not identified through factor analysis but was an addition by the authors. This is reflected in the relatively poor properties of the scale including the highest standard error, lowest internal consistency, lowest correlation with other scales, lowest correlation with other measures, and lowest correlation with trauma symptoms. It also showed one of the poorest correlations with violence in this study (other than the pseudo-independence scale which showed the weakest correlation with violence overall). Confirmatory factor analysis could be used to assess the addition of the self-aggrandising scale. Otherwise, the FAVT shows good psychometric properties in measuring a difficult construct to define, although it could not claim to measure all types of thoughts associated with violence.

The violent cognitions measured by the SIV and FAVT in this study were found to be more prevalent in the PTSD group than the non-PTSD group. This suggests the experience of PTSD may increase these types of cognitions. This fits with theories of PTSD which highlight changes in cognitions as a result of PTSD, such as the belief that the world is dangerous and others cannot be trusted (Ehlers & Clark, 2000; Epstein, 1991; Foa & Rothbaum, 1998; McCann & Pearlman, 1990). The 'survival mode' information processing theory of PTSD highlights the role of these types of cognitions in the perception of threat and hostile attribution bias. These violent cognitions were also found to predict whether an individual had behaved violently on more than one occasion or not, providing further support for the discriminative ability of the SIV and FAVT. It was therefore hypothesised that these cognitions may mediate PTSD and violent behaviour.

A mediation analysis, as described by Baron and Kenny (1986), requires a significant relationship between the predictor (PTSD) and the outcome (violence), and this condition was met in the current study. A relationship between the predictor (PTSD) and the mediator (violent thoughts and violent fantasy) is also required and this condition was met in both cases. If the mediator is contributing to the relationship between the predictor (PTSD) and the outcome (violence), the impact of the predictor should be reduced when the mediator is

also in the model. This was true for violent fantasy as measured using the SIV, suggesting violent fantasy may mediate PTSD and violent behaviour. This fits with previous research which implicates violent fantasy in increasing the risk of violent behaviour when an individual has been exposed to violence (Guerra, Huesmann & Spindler, 2003; Smith, Fischer, & Watson, 2009). The rehearsal of a violent script is thought to increase the likelihood that violent script is selected as a behavioural response due to increased accessibility (Huesmann, 1998). Alongside the witnessing of violence, this may normalise the use of violence (Guerra, Huesmann & Spindler, 2003; Smith, Fischer, & Watson, 2009). These studies have highlighted that this relationship between fantasy and behaviour only exists when the individual has actually witnessed violence, as well as fantasising about it. Therefore, the experience of violent trauma such as combat exposure could provide these conditions, along with the increased perception of threat and higher levels of anger rumination associated with PTSD.

Despite the relationship found between PTSD and violent thoughts measured using the FAVT, and between those violent thoughts and the perpetration of violence, the violent thoughts did not explain a sufficient amount of the relationship between PTSD and violence in the mediation analysis. This may have been due to poor statistical sensitivity and power, related to problems with the continuous data and sample size, and the methodology used. However, it also suggests there may be other variables accounting for much of this relationship which were not controlled for, and various limitations to the study design were identified. The factors identified in the literature that mediate the relationship between PTSD and violence, such as demographics, would need to be controlled for in order to more accurately measure the impact of violent thoughts. This was not possible as this would threaten the anonymity of the participants in the study and there were limitations on the permissions obtained. Similarly, the GAM details a number of factors which may also need to be accounted for but were beyond the scope of the study, such as personality factors and situational factors. Therefore, violent thoughts form one small but interlinked part of this model. Other possible confounding variables not yet explored in this population may include: personality disorder, pre-combat PTSD, and the time since the trauma exposure.

It is also possible that violent thoughts do not act as a mediator, but are generated post-hoc in order to justify the violent behaviour. However, these justifications may also perpetuate violent behaviour. It remains worth investigating changes in thoughts following PTSD that

could become integrated into the individual's schemata about the world, the self, and others, and lead to violent behaviour. It is therefore also worth considering what interventions may be effective in avoiding this progression, including the sorts of cognitions that could be targeted in treatment of violent individuals.

Finally, it was not confirmed that the control group participants did not have PTSD. PTSD is often considered to be a continuous concept rather than a dichotomous one. Therefore, it may also be worth considering whether these changes in cognitions are also present for individuals who experience trauma but do not develop PTSD, as demonstrated by Marshall, Panuzio, & Taft (2011). They found a relationship between post-traumatic cognitions and intimate partner violence in individuals who had experienced trauma but had no diagnosis of PTSD.

Applicability of findings

In order to integrate the literature on PTSD and violence in military populations, and identify a pathway to violent behaviour, a model is proposed using the risk factors that have been highlighted so far within this thesis (Figure 3). This model is based on the general aggression model and survival mode theory of PTSD, as well as the factors found in the literature to mediate PTSD and violence.

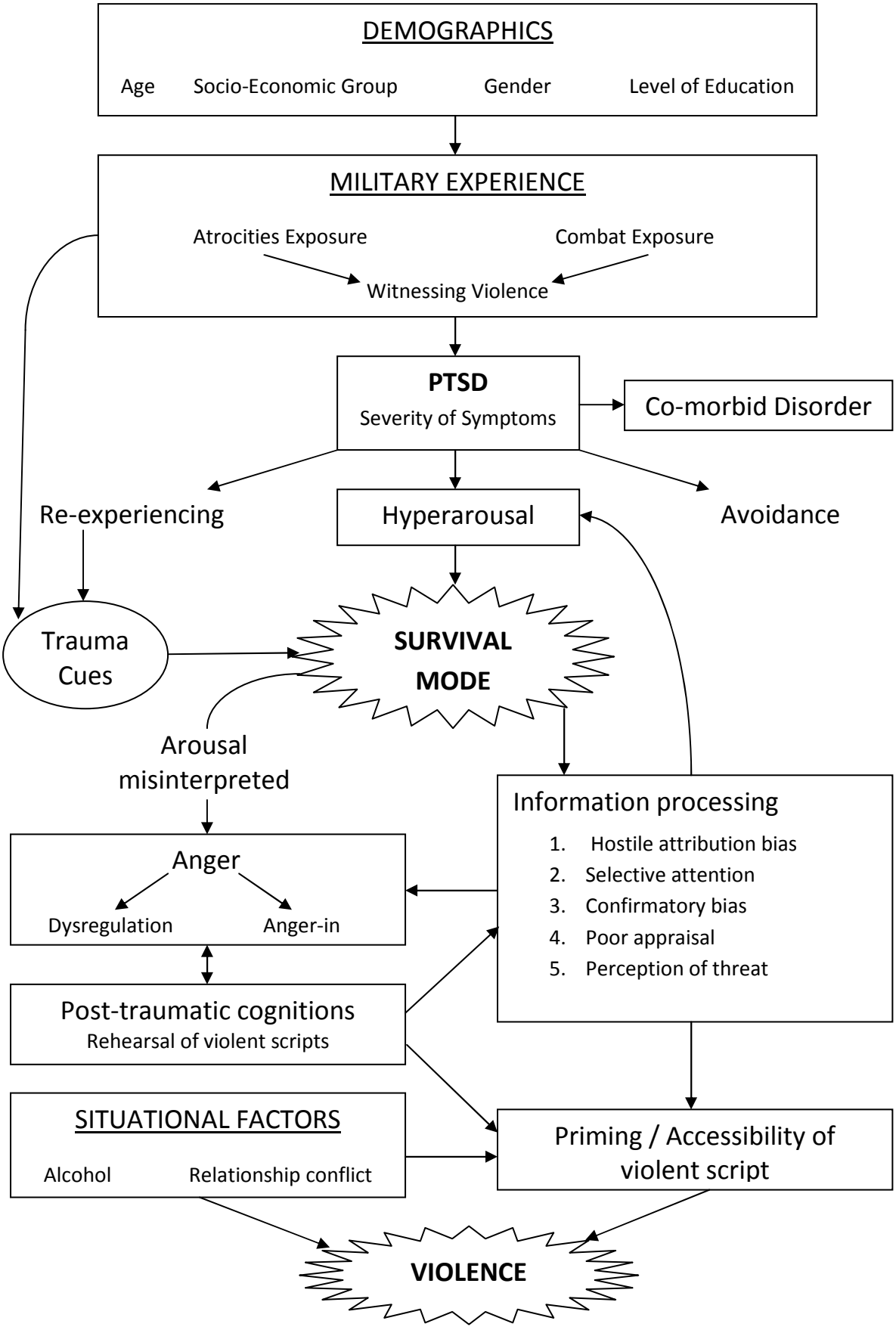

Figure 3: Model of Pathway to Violence in Military Personnel with PTSD

This model contains only the factors identified in theories and research so far; it is likely there will be other factors that have not been accounted for. Similarly, the model could potentially be simplified where some factors contribute little, or some factors may be interchangeable with others, such as the context of the violence.

There are factors in this model that have been identified as risk factors for violence in the general population. However, there are also some factors unique to military personnel who experience trauma, therefore this pathway is unique to military personnel in some ways. As it is based on research specific to this population it could not be said to be generalisable to civilian populations, although research on civilian populations could also be explored for a similar pathway. Similarly, this model has been developed through research with military personnel with a diagnosis of PTSD. If PTSD is perceived as a continuum of symptoms rather than a dichotomous concept, there could be potential to explore the generalisability of the model to those who have experienced a psychological response to trauma but do not have a diagnosis of PTSD.

The number of factors to consider highlights the complex nature of violence risk assessment. A structured professional judgement protocol for violence risk assessment could be developed for this population to assist practitioners working with military and veteran offenders, incorporating the risk factors identified in the research. This would need to be subject to tests of reliability, validity, and discriminative ability, and could include pre-disposing factors such as demographics, trauma-related factors such as combat experience, and acute factors such as anger and post-traumatic cognitions, to bring together an overall picture of an individual's risk. If successful in discriminating individuals who are violent, this type of assessment could be used by the MOD mental health services, HM Prison Service, Colchester military prison, and military resettlement organisations.

Treatment Implications

It could be argued that we have additional obligations to treat veterans if their military service has contributed to their offending. If there are additional support services available to them due to their veteran status we also have an obligation to ensure these individuals are accessing these. For example, veterans' mental health has been made a priority for Improving Access to Psychological Therapies (IAPT) services (IAPT, Veterans Positive Practice Guide, 2009). Given that on average veterans take 14½ years to come forward for

treatment for PTSD (The Howard League, 2011), support with resettlement is also vital for veterans to avoid increasing their risk on leaving the military.

In identifying individual treatment requirements, there is little guidance in the literature as to the specific cognitions to target in treatment to address thinking associated with violence (Polaschek et al., 2009). The FAVT (Firestone & Firestone, 2008) could help to identify such cognitions for targeting in treatment. For patients with PTSD symptoms, measures of post-traumatic cognitions such as the PTCI (Foa et al., 1999) could also be used to assess for maladaptive thinking that could be linked to violence. Similarly, a treatment needs assessment could assess for the presence of other factors identified in the literature as increasing risk of violence for veterans with PTSD including: an assessment of anger, such as the Novaco Anger Scale (NAS, Novaco, 1994); an assessment of level of symptoms, particularly hyperarousal, such as the Traumatic Stress Inventory (TSI, Briere, 1995); an assessment for potential situational factors such as alcohol use using the Alcohol Use Disorders Identification Test (AUDIT, Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), and relationship conflict, using the Conflicts Tactics Scale (CTS, Straus, 1979); and an assessment for military factors such as level of combat exposure, using the Combat Exposure Scale (CES, Keane et al., 1989). Assessment for co-morbid disorder may also be implicated, such as depression, which could be assessed using the Beck Depression Inventory (BDI, Beck, Steer, & Brown, 1996).

Effective treatment for PTSD, as recommended by the National Institute for Clinical Excellence (NICE), includes Eye Movement Desensitisation and Reprocessing (EMDR) and Cognitive Behavioural Therapy (CBT). CBT could help to address violent thoughts and the perception of threat. However, there are a number of other treatment approaches for PTSD that have been developed which could be helpful in addressing post-traumatic cognitions. Cognitive Processing Therapy (CPT) aims to overcome avoidance symptoms by exploring a written account of the trauma. It then aims to identify where the individual has developed maladaptive beliefs about elements of the trauma which may have been over-generalised to the rest of the world, themselves and others. CPT then allows the individual to challenge these beliefs. Cognitions that may have developed though trauma exposure such as, “I can’t trust others”, may also prime perception of threat and hostile attribution in violent individuals. Therefore, this treatment may also reduce the risk of violence, and has been found to be effective in reducing PTSD symptoms (Monson et al., 2006). However, there are

a number of other factors that would also need to be addressed in treatment such as the regulation of anger and arousal symptoms, as well as any co-morbid disorder or alcohol misuse.

HMP Grendon have specifically targeted individuals in custody who have previously served in the Armed Forces for treatment within their therapeutic community, offering an opportunity for individuals to address anger, guilt, aggression and frustration in a safe environment through contact with psychology services and prison staff who are also ex-services personnel (Ashton, n/d). HMP Grendon have also developed and piloted a fantasy modification programme, targeted at both violent and sexual offenders to address the reinforcing nature of their cognitions. The success of this programme could inform treatment of violent fantasy for individuals with PTSD.

Limitations

Thus far, none of the research into PTSD and violence has been able to determine causal relationships, only correlations, and has been retrospective. A study of longitudinal design would allow for causal inferences to be drawn and temporal relationships to be explored. The participants' reports of violence may have predated their trauma. This study was not able to confirm the level of violence for the sample prior to the trauma; however, in a review of the literature, Beckerman and Fontana (1989) found that veterans in prison were more likely to be there for a first offence than other prisoners, and Collins and Bailey (1990) found the majority of civilians with PTSD in prison were arrested in the same year, or the year preceding the onset of their symptoms.

Combat Stress highlights that many of their clients have pre-existing vulnerabilities to criminal behaviour, and military service acts as a protective factor, providing structure, support and positive relationships. This must be considered when undertaking research into the impact of PTSD on violence, particularly as many of the risk factors for violence are also the risk factors identified as increasing the risk of developing PTSD. For example, Begić and Jokić-Begić (2001) found that level of education partially accounted for the relationship between PTSD and violent behaviour in a military sample, and this is also a risk factor for developing PTSD (Brewin, Andrews, & Valentine, 2000). A meta-analysis of risk factors for developing PTSD in the general population found that level of education, previous trauma, and childhood adversity consistently predicted trauma (Brewin et al., 2000).

Therefore, the relationship between PTSD and violence may be due to the number of shared risk factors. However, Orcutt et al. (2003) used structural equation modelling, including many of these factors, and found that stressful early family life, childhood anti-social behaviour, and war zone stress were only indirectly associated with intimate partner violence via PTSD.

There were also a number of limitations identified in the design of the current research study. As with previous studies, it only examined correlations and did not control for a number of variables. In order to preserve the participants' anonymity and encourage honest responding, more detailed information was not obtained regarding other factors such as combat exposure. Therefore, there were too many confounding variables that were not controlled for.

Alongside this, measuring thoughts appears to be a particularly difficult task. It is not possible to account for all manifestations of violent thoughts for an individual. It could be argued that violent cognitions are a constantly changing, dynamic factor, and as such the level of an individual's violent cognitions at one point in time may completely change in the near future. However, Grisso et al. (2000) found that the reporting of violent cognitions was fairly consistent over time.

Problems with this study were also associated with the violence measure which did not produce normally distributed data and was difficult for participants to use. This led to categorisation of participants as violent or not violent, thereby losing information. The information provided on the violence measure was not corroborated with other sources as this information was not available within the permissions obtained, therefore was reliant on self-report. Access to official conviction data could have provided a more objective measure, however some of the violence reported may be unconvicted, therefore this information would have been lost. Although the violence definition used in the research study was broad, it may have excluded forms of aggression which have been included in other research studies, such as property damage, as well as some forms of verbal and psychological aggression, and sexual aggression.

Finally, the theories and research outlined here do not explain why some individuals with PTSD develop violent behaviour but others do not. This could be explored in future research to identify whether there are differences in their symptoms or characteristics.

Future Research

The violent thoughts measured using the FAVT did not account for a sufficient amount of the relationship between PTSD and violence; therefore, future research could include more of the risk factors identified in the research that may be contributing to this relationship. This could provide evidence for the model proposed here, as well as potentially identifying other contributing factors, such as personality disorder.

Future research could also focus on the generalisability of this model. In their meta-analysis of risk factors for PTSD, Brewin et al. (2000) included studies of both military and civilian populations. They found differences in the results for the two groups inviting caution when generalising results between them. In order to increase the generalisability of these findings, this research could be replicated in civilian populations. HMP Grendon is currently completing similar research with a much larger sample of both civilian and ex-military prisoners which may find more generalisable results. This research will also consider the impact of treatment at HMP Grendon on these factors.

The FAVT was not developed specifically for a PTSD population and cannot claim to include all possible violent thoughts. A qualitative exploration of violent thoughts and changes in schemata following trauma in military veterans in the criminal justice system could identify cognitions more specific to these individuals. The PTCI (Foa et al., 1999) may be a starting point for developing such a measure.

The present study did not consider the impact of the violent cognitions on different types of aggression. Much of the research has focussed on intimate partner violence as this appears to be the most common offence for veterans (NAPO, 2008, 2009). However, there is also evidence that there is a higher rate of sexual violence among veterans than the general population (DASA, 2010). This type of violence could also be examined.

Finally, military service has been proposed as a protective factor against violence for military personnel. Rather than focussing on risk, future research could examine the presence of protective factors. Exploration of protective factors could help to distinguish between individuals with PTSD who go on to be violent and those who do not.

References

Abel, G. G., Gore, D. K., Holland, C. L., Camps, N., Becker, J. V., & Rathner, J. (1989). The measurement of the cognitive distortions of child molesters. *Sexual Abuse: A Journal of Research and Treatment, 2*, 135-152.

Anderson, C. A., & Bushman, B. J. (2002). Human Aggression. *Annual Review of Psychology, 53*, 27-51.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders (4th Ed., text revision)*. Washington, DC: Author.

Ashton, C. (n/d). *Still Fighting Those Battles? Help for Service Veterans in Prison* (Leaflet). Aylesbury, HMP Grendon.

Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *The Alcohol Use Disorders Identification Test.* World Health Organisation.

Barazzone, N., & Davey, G. C. L. (2009). Anger potentiates the reporting of threatening interpretations: An experimental study. *Journal of Anxiety Disorders, 23*, 489–495.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

Beck, A. T. (1988). *Beck Hopelessness Scale.* San Antonio, Texas: The Psychological Corporation.

Beck, A. T., & Freeman, A. (1990). *Cognitive Therapy of Personality Disorders*. New York: Guilford.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, Texas: The Psychological Corporation.

Beckerman, A., & Fontana, L. (1989). Vietnam veterans and the criminal justice system: A selected review. *Criminal Justice and Behavior, 16*, 412-428.

Beckham, J. C., Feldman, M. E., & Kirby, A. C. (1998). Atrocities exposure in Vietnam combat veterans with chronic posttraumatic stress disorder: Relationship to combat exposure, symptom severity, guilt, and interpersonal violence. *Journal of Traumatic Stress, 11*, 777-785.

Beckham, J. C., Feldman, M. E., Kirby, A. C., Hertzberg, M. A., & Moore, S. D. (1997). Interpersonal violence and its correlates in Vietnam Veterans with chronic posttraumatic stress disorder. *Journal of Clinical Psychology, 53*, 859-869.

Beckham, J. C., Moore, S. D., & Reynolds, V. (2000). Interpersonal hostility and violence in Vietnam combat veterans with chronic posttraumatic stress disorder: A review of theoretical models and empirical evidence. *Aggression and Violent Behaviour, 5*, 451-466.

Begić, D., & Jokić-Begić, N. (2001). Aggressive behaviour in combat veterans with post-traumatic stress disorder. *Military Medicine, 166*, 671-676.

Berkowitz, L. (1990). On the formation and regulation of anger and aggression: A cognitive-neoassociationistic analysis. *American Journal of Psychology*, *45*, 494–503.

Booth-Kewley, S., Larson, G. E., Highfill-McRoy, R. M., Garland, C. F., & Gaskin, T. A. (2010). Factors associated with anti-social behaviour in combat veterans, *Aggressive Behavior*, *36*, 330-337.

Borders, M., A. & Kennedy, C. H. (2006). Psychological Interventions after Disaster or Trauma. In C. H. Kennedy, & E. A. Zillmer, (Eds.), *Military Psychology* (pp. 331-352). New York: Guildford Press.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, *68*, 748-766.

Briere, J. (1995). *Trauma Symptom Inventory: Professional Manual*. Odessa, FL: Psychological Assessment Resources.

Bumby, K. M. (1996). Assessing the cognitive distortions of child molesters and rapists: Development and validation of the MOLEST and RAPE scales. *Sexual Abuse: Journal of Research and Treatment*, *8*, 37-54.

Burt, M. R. (1980). Cultural myths and supports for rape. *Journal of Personality and Social Psychology*, *38*, 217-230.

Byrne, C. A., & Riggs, D. S. (1996). The cycle of trauma: Relationship aggression in male Vietnam veterans with symptoms of posttraumatic stress disorder. *Violence and Victims*, *11*, 213-225.

Carnagey, N., & Anderson, C. (2004). Video game exposure and aggression, a literary review. *Minerva Psichiatrica*, *45*, 1-18.

Cattel, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioural Research*, *1*, 245-276.

Cattel, R. B. (1978). *The Scientific Use of Factor Analysis*. New York: Plenum.

Chemtob, C. M., Hamada, R. S., Roitblat, H. L., & Muraoka, M. Y. (1994). Anger, impulsivity, and anger control in combat-related PTSD. *Journal of Consulting and Clinical Psychology*, *62*, 827-832.

Chemtob, C. M., Novaco, R. W., Hamada, R. S., Gross, D. M., & Smith, G. (1997). Anger regulation deficits in combat-related posttraumatic stress disorder. *Journal of Traumatic Stress*, *10*, 17-36.

Chemtob, C. M., Roitblatt, H., Hamada, R, Carlson, J. & Twentyman, C. (1988). A cognitive action theory of post-traumatic stress disorder. *Journal of Anxiety Disorders*, *2*, 253-275.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*, 155-159.

Collins, J. J., & Bailey, S. L. (1990). Traumatic stress disorder and violent behaviour. *Journal of Traumatic Stress*, *3*, 203-220.

Comrey, A. & Lee, H. (1992). *A First Course in Factor Analysis* (2nd ed). Hillsdale, NJ: Erlbaum.

Cronin, C. (1995). Adolescent reports of parental spousal violence in military and civilian families. *Journal of Interpersonal Violence, 10*, 117-122.

Dalgleish, T. (1999). Cognitive Theories of PTSD. In Yule, W. (Ed.), *PTSD: Concepts and Therapy* (pp. 193-220). New York: Wiley.

DASA (2010). *Data Analytical Services and Advice: Estimating the Proportion of Prisoners in England and Wales who are ex-Armed Forces - Further Analysis*. London: Ministry of Defence.

De Ayala, R. J. (2008). *The Theory and Practice of Item Response Theory (Methodology in the Social Sciences)*. New York, NY: Guilford Press.

Doucette-Gates, A., Firestone, R. W., & Firestone, L. A. (1999). Assessing violent thoughts: The relationship between thought processes and violent behaviour. *Psychologica Belgica*, *39*, 113-134.

Douglas, K., Webster, C., & Hart, S. (in print). HCR-20 version 3. Vancouver: Simon Fraser University.

Ehlers, A., & Clark, D. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour, Research and Therapy*, *38*, 319-345.

Epstein, S. (1991). Impulse control and self-destructive behavior. In L. P. Lipsitt,, & L L. Mitick, (Eds.), *Self-Regulatory Behavior and Risk-Taking: Causes and Consequences* (pp. 273-284). Norwood, NJ: Ablex.

Fear, N. T., Iversen, A., Meltzer, H., Workman, L., Hull, L., Greenberg, N., Barker, C., Browne, T., Earnshaw, M., Horn, O., Jones, M., Murphy, D., Rona, R. J., Hotopf, M., & Wessely, S. (2007). Patterns of drinking in the UK Armed Forces. *Addiction, 102*, 1749–1759.

Fear, N. T., Jones, M., Murphy, D., Hull, L., Iversen, A. C., Coker, B., Machell, L., Sundin, J., Woodhead, C., Jones, N., Greenberg, N., Landau, S., Dandeker, C., Rona, R. J., Hotopf, M., & Wessely, S. (2010). What are the consequences of deployment to Iraq and Afghanistan on the mental health of the UK armed forces? A cohort study. *The Lancet, 375*, 1783-1797.

Field, A. (2005). *Discovering Statistics using SPSS* (2nd ed.). London: Sage.

Firestone, R. W. (1988). *Voice therapy: A Psychotherapeutic Approach to Self-Destructive Behaviour*. New York: Human Sciences Press.

Firestone, R. W. (1990). Voice therapy. In Zeig, J. & Munion, W. (Eds.). *What is Psychotherapy? Contemporary Perspectives* (pp. 68-74). San Francisco, CA: Jossey-Bass.

Firestone, R. W. (1997). *Combating Destructive Thought Processes: Voice Therapy and Separation Theory*. Thousand Oaks, CA: Sage.

Firestone, R. W. & Firestone, L. A. (2008). *Firestone Assessment of Violent Thoughts: Professional Manual.* Odessa, FL: Psychological Assessment Resources.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B.W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-CV).* Washington, D.C.: American Psychiatric Press, Inc.

Flesch, R. (1974). *The Art of Readable Writing*. New York: Harper & Row. (Original work published in 1949).

Foa, E. B., & Rothbaum, B. O. (1998). *Treating the Trauma of Rape: Cognitive Behavioral Therapy for PTSD*. New York: Guilford Press.

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The Posttraumatic Cognitions Inventory: Development and Validation. *Psychological Assessment, 11,* 303-314.

Freeman, T. W., Roca, V., & Kimbrell, T. (2003). A survey of gun collection and use among three groups of veteran patients admitted to veterans affairs hospital treatment programs. *Southern Medical Journal, 96,* 240-243.

Funk, J. B., Elliott, R., Urman, M. L., Flores, G. T., & Mock, R. M. (1999). The attitudes towards violence scale: A measure for adolescents. *Journal of Interpersonal Violence, 14,* 1123-1136.

Gearing, R. (2011). *Enduring Freedom: An Afghan Anthology*. Brighton: Firestep Publishing

Gerlock, A. A. (2004). Domestic violence and post-traumatic stress disorder severity for participants of a domestic violence rehabilitation program. *Military Medicine, 169,* 470-474.

Glenn, D. M., Beckham, J. C., Feldman, M. E., Kirby, A. C., Hertzberg, M. A., & Moore, S. D. (2002). Violence and hostility among families of Vietnam veterans with combat-related posttraumatic stress disorder. *Violence and Victims, 17,* 473-489.

Goff, A., Rose, E., Rose, S., & Purves, D. (2007). Does PTSD occur in sentenced prison populations? A systematic literature review. *Criminal Behaviour and Mental Health, 17,* 152-162.

Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research, 26,* 499-510.

Greenwald, D. F., & Harder, D. W. (1997). Fantasies, coping behavior, and psychopathology, *Journal of Clinical Psychology, 53,* 1-7.

Grisso, T., Davis, J., Vesselinov, R., Appelbaum, P. & Monahan, J. (2000). Violent thoughts and violent behaviour following hospitalisation for mental disorder. *Journal of Consulting and Clinical Psychology, 68,* 388-398.

Gudjonsson, G. H., & Singh, K. K. (1989). The revised Blame Attribution Inventory. *Personality and Individual Differences, 10,* 67-70.

Guerra, N. G., Huesmann, L. R., & Spindler, A. (2003). Community violence exposure, social cognition, and aggression among urban elementary school children. *Child Development, 74*, 1561-1576.

Howard League for Penal Reform (2010a). *Inquiry into former armed service personnel in prison: notes from first oral evidence session held on Tuesday 26th January 2010 at Broadway House, Tothill Street, London*. Available: http://www.howardleague.org/fileadmin/howard_league/user/pdf/Veterans_inquiry/9_March_consulation_notes.pdf (accessed: 10th June 2011).

Howard League for Penal Reform (2010b). *Inquiry into former armed service personnel in prison: notes from second oral evidence session held on Tuesday 9th March 2010 at Broadway House, Tothill Street, London*. Available: http://www.howardleague.org/fileadmin/howard_league/user/pdf/Veterans_inquiry/26_Jan_consultation_notes_01.pdf (accessed: 10th June 2011).

Howard League for Penal Reform (2010c). *Inquiry into former armed service personnel in prison: notes from the fourth oral evidence session held on Tuesday, 4th May 2010 at Broadway House, Tothill Street, London.* Available: http://d19ylpo4aovc7m.cloudfront.net/fileadmin/howard_league/user/pdf/Veterans_inquiry/4th_May_evidence_session.pdf (accessed: 18th January 2012).

Howard League for Penal Reform (2011). *Report of the Inquiry into Former Armed Services Personnel in Prison.* London: Howard League for Penal Reform.

Huesmann, L. R. (1988). An information processing model for the development of aggression. *Aggressive Behavior, 14*, 13-24.

Huesmann L. R., & Eron L. D. (1984). Cognitive processes and the persistence of aggressive behavior. *Aggressive Behavior, 10*, 243–251.

IAPT (2009). *Veterans Positive Practice Guide*. Available: http://iapt.nmhdu.org.uk/silo/files/veterans-positive-practice-guide.pdf (accessed: 10th June 2011).

Ireland, J. (2009). Conducting individualised theory-driven assessments of violent offenders. In J. Ireland, C. Ireland, & P. Birch, (Eds.), *Violent and Sexual Offenders: Assessment, Treatment and Management* (pp. 68-96). Portland OR: Willan Publishing.

Jakupcak, M., Conybeare, D., Phelps, L., Hunt, S., Holmes, H. A., Felker, B., Klevens, M., & McFall, M. E. (2007). Anger, hostility, and aggression among Iraq and Afghanistan war veterans reporting PTSD and subthreshold PTSD. *Journal of Traumatic Stress, 20*, 945-954.

Jakupcak, M., & Tull, M. T. (2005). Effects of trauma exposure on anger, aggression, and violence in a nonclinical sample of men. *Violence and Victims, 20*, 589-598.

Janoff-Bulman, R. (1992). *Shattered Assumptions: Towards a New Psychology of Trauma.* New York: Free Press.

Keane, T. M., Fairbank, J. A., Caddell, J. M., Zimering, R T., Taylor, K. L., & Mora, C. A. (1989). Clinical evaluation of a measure to assess combat exposure. *Psychological Assessment, 1*, 53-55.

Kenny, D. A. (2008). *Mediation with Dichotomous Outcomes*. Retrieved 20th February 2013 from: http://davidakenny.net/doc/dichmed.pdf

Kline, P. (1986). *A Handbook of Test Construction: Introduction to Psychometric Design*. London: Methuen & Co. Ltd.

Kline, P. (1998). *The New Psychometrics: Science, Psychology and Measurement*. London: Routledge.

Krug, E., Mercy, J., Dahlberg, L., & Zwi, A. (2002). The World Report on Violence and Health. *The Lancet*, *360*, 1083-1088.

Kulka, R. A., Schlenger, W. E., Fairbank, J. A., Hough, R. L., Jordan, B. K., Marmar, C. R., & Weiss, D. S. (1990). *Trauma and the Vietnam War Generation*. New York: Brunner/Mazel.

Long, J. S. (1997). *Regression Models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage Publications.

McCann, I. L., & Pearlman, L. A. (1990). *Psychological Trauma and the Adult Survivor: Theory, Therapy, and Transformation*. New York: Brunner/Mazel.

McFall, M., Fontana, A., Raskind, M., & Rosenheck, R. (1999). Analysis of violent behaviour in Vietnam combat veteran psychiatric inpatients with posttraumatic stress disorder. *Journal of Traumatic Stress*, *12*, 501-517.

MacKinnon, D. P., & Dwyer, J. H. (1993). Estimating mediated effects in prevention studies. *Evaluation Review*, *17*, 144-158.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39, 99–128.*

Maguire, M. (2004). *Understanding Psychology and Crime: Perspectives on Theory and Action*. Berkshire: Open University Press.

Marshall, A. D., Panuzio, J., & Taft, C. T. (2005). Intimate partner violence among military veterans and active duty servicemen. *Clinical Psychology Review*, *25*, 862-876.

Marshall, A. D., Robinson, L. R., & Azar, S. T. (2011). Cognitive and emotional contributors to intimate partner violence perpetration following trauma. *Journal of Traumatic Stress*, *24*, 586-590.

Miller, H. A. (2006). *Inventory of Offender Risk, Needs, and Strengths: Professional Manual*. Lutz, FL: Psychological Assessment Resources.

Monahan, J., Steadman, H., Silver, E., Appelbaum, P., Robbins, P., Mulvey, E., Roth, L., Grisso, T., & Banks, S. (2001). *Rethinking Risk Assessment: The MacArthur Study of Mental Disorder and Violence.* New York: Oxford University Press.

Monson, C. M., Schnurr, P. P., Resick, P. A., Friedman, M. J., Young-Xu, Y., Stevens, S. P. (2006). Cognitive processing therapy for veterans with military-related posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*, *74*, 898-907.

Morey, L. C. (1991). *Personality Assessment Inventory: Professional Manual.* Lutz, FL: Psychological Assessment Resources.

Mullen, P. E. (2006). Schizophrenia and violence: From correlations to preventative strategies. *Advances in Psychiatric Treatment, 12,* 239-248.

NAPO (2008). *Ex-Armed Forces Personnel and the Criminal Justice System: A Briefing from NAPO.* Available: http://www.napo.org.uk/about/veteransincjs.cfm (accessed: 10th June 2011).

NAPO (2009). *Armed Forces and the Criminal Justice System: A Briefing from NAPO.* Available: http://www.napo.org.uk/about/veteransincjs.cfm (accessed: 10th June 2011).

Novaco, R.W. (1994). Anger as a risk factor for violence among the mentally disordered. In Monahan, J. & Steadman, H. J. (Eds.), *Violence and Mental Disorder: Developments in Risk Assessment* (pp. 21-60). Chicago, IL: University of Chicago Press.

Novaco, R. W., & Chemtob, C. M. (2002). Anger and combat-related posttraumatic stress disorder. *Journal of Traumatic Stress, 15,* 123-132.

Orcutt, H. K., King, L. A., & King, D. W. (2003). Male-perpetrated violence among Vietnam veteran couples: Relationships with veteran's early life characteristics, trauma history, and PTSD symptomatology. *Journal of Traumatic Stress, 16,* 381-390.

Orth, U., & Wieland, E. (2006). Anger, hostility, and posttraumatic stress disorder in trauma-exposed adults: A meta-analysis. *Journal of Consulting and Clinical Psychology, 74,* 698-706.

Parrott, D., Drobes, D., Saladin, M., Coffey, S., & Dansky, B. (2003). Perpetration of partner violence: Effects of cocaine and alcohol dependence and posttraumatic stress disorder. *Addictive Behaviours, 18,* 1587-1602.

Peduzzi, P., Concato, J., Kemper, E., Holford, T. R., Feinstein, A. R. (1996). A simulation study of the number of events per variable in logistic regression analysis. *Journal of Clinical Epidemiology , 49,* 1373-1379.

Pitman, R.K., Orr, S.P., Forgue D.F., de Jong, J.B., & Claiborn JM. (1987). Psychophysiologic assessment of posttraumatic stress disorder imagery in Vietnam combat veterans. *Archive of General Psychiatry, 44,* 970-975.

Plutchik, R., & van Praag, H. M. (1990). A self-report measure of violence risk, II. *Comprehensive Psychiatry, 31,* 450-456.

Polaschek, D. L. L., Calvert, S. W., & Gannon, T. A. (2009). Linking violent thinking: Implicit theory-based research with violent offenders. *Journal of Interpersonal Violence, 24,* 75-96.

Preacher, K. J. (2012). *Calculation for the Sobel Test: An Interactive Calculation Tool for Mediation Tests.* Retrieved 10th February 2013 from http://quantpsy.org/sobel/sobel.htm.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36*, 717-731.

Quinsey, V. L., Harris, G. T., Rice, M. E., & Cormier, C. A. (2006). *Violent Offenders – Appraising and Managing Risk.* Washington D.C.: American Psychological Association.

Rawlings, D., & Freeman, J. L. (1996). A questionnaire for the measurement of paranoia/suspiciousness. *British Journal of Clinical Psychology, 35*, 451-461.

Rosenberg, M. (1979). *Conceiving the Self.* New York: Basic Books.

Sherman, M. D., Sautter, F., Jackson, M. H., Lyons, J. A., & Han, X. (2006). Domestic violence in veterans with posttraumatic stress disorder who seek couples therapy. *Journal of Marital and Family Therapy, 32*, 479-490.

Shields, I. W., & Whitehall, G. C. (1991). *The Pride in Delinquency Scale*. Paper presented at the Eastern Ontario correctional psychologists' winter conference, Burritts Rapids, Canada.

Silva, J. A., Derecho, D. V., Leong, G. B., Weinstock, R., & Ferrari, M. M. (2001). A classification of psychological factors leading to violent behaviour in posttraumatic stress disorder. *Journal of Forensic Science, 46,* 309-316.

Smith, C. E., Fischer, K. W., & Watson, M. W. (2009). Toward a refined view of aggressive fantasy as a risk factor for aggression: interation effects involving cognitive and situational variables. *Aggressive Behavior, 35,* 313-323.

Steadman, H. J., Mulvey, E., Monahan, J., Robbins, P. C., Appelbaum, P. S., Grisso, T., Roth, L. H. & Silver, E. (1998). Violence by people discharged from acute psychiatric inpatient facilities and by others in the same neighborhoods. *Archives of General Psychiatry, 55,* 393–401.

Stevens, J. P. (1992). *Applied Multivariate Statistics for the Social Sciences* (2nd edition). Hillsdale, NJ: Erlbaum.

Straus, M. A. (1979). Measuring intra family conflict and violence: The Conflict Tactics Scale. *Journal of Marriage and the Family, 41*, 75-88.

Swets J. (1988). Measuring the accuracy of diagnostic systems. *Science, 240*, 1285–1293.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using Multivariate Statistics* (3rd ed.). New York, NY: Harper & Row.

Tabachnick, B. G., & Fidell, L.S. (2001). *Using multivariate statistics*. (4th ed.). London: Allyn and Bacon.

Taft, C. T., Kaloupek, D. G., Schumm, J. A., Marshall, A. D., Panuzio, J., King, D. W., & Keane, T. M. (2007a). Posttraumatic stress disorder symptoms, physiological reactivity, alcohol problems, and aggression among military veterans. *Journal of Abnormal Psychology, 116*, 498-507.

Taft, C. T., Pless, A. P., Stalans, L. J., Koenen, K. C., King, L. A., & King, D. W. (2005). Risk factors for partner violence among a national sample of combat veterans. *Journal of Consulting and Clinical Psychology, 73*, 151-159.

Taft, C. T., Street, A. E., Marshall, A. D., Dowdall, D. J., & Riggs, D. S. (2007b). Posttraumatic stress disorder, anger, and partner abuse among Vietnam combat veterans. *Journal of Family Psychology, 21*, 270-277.

Taft, C. T., Vogt, D. S., Marshall, A. D., Panuzio, J.¸& Niles, B. L. (2007c). Aggression among combat veterans: relationships with combat exposure and symptoms of posttraumatic stress disorder, dysporia, and anxiety. *Journal of Traumatic Stress, 20*, 135-145.

Taft, C. T., Weatherill, R. P., Woodward, H. E., Pinto, L. A., Watkins, L. E., Miller, M. W., & Dekel, R. (2009). Intimate partner and general aggression perpetration among combat veterans presenting to a posttraumatic stress disorder clinic. *American Journal of Orthopsychiatry, 79*, 461-468.

Tarrier, N. & Sommerfield, C. (2003). Alcohol and substance use in civilian chronic PTSD patients seeking psychological treatment. *Journal of Substance Use, 8*, 197-204.

Teten, A. L., Schumacher, J. A., Taft, C. T., Stanley, M. A., Kent, T. A., Bailey, S. D., Dunn, N. J., & White, D. L. (2010). Intimate partner aggression perpetrated and sustained by male Afghanistan, Iraq, and Vietnam veterans with and without posttraumatic stress disorder. *Journal of Interpersonal Violence, 25*, 1612-1630.

United States Department of Veteran Affairs, National Center for PTSD (2010). *Criminal Behaviour and PTSD: An Analysis*. Retrieved from http://www.ptsd.va.gov/professional/pages/criminal-behavior-ptsd.asp (accessed: 11th June 2011).

Walker, J. S. (2005). The Maudsley Violence Questionnaire: Initial validation and reliability. *Personality and Individual Differences, 38*, 187-201.

Walters, G. D. (1995). The psychological inventory of criminal thinking styles – Part 1: reliability and preliminary validity. *Criminal Justice and Behavior, 22*, 307-325.

Webster, C. D., Douglas, K. S., Eaves, D. and Hart, S. D. (1997). *HCR-20 Assessing Risk for Violence. Version 2.* Vancouver: Simon Fraser University and Forensic Psychiatric Services Commission of British Columbia.

Wood A. (2006). Correlating violence and socio-economic inequality: an empirical analysis. In: McCarthy, T. E., (Ed.), *Attacking the Root Causes of Torture, Poverty, Inequality and Violence.* Geneva: World Organisation Against Torture. http://omct.org/pdf/ESCR/2006/omct_desc_study_2006_cd/read_me_fi rst.html?PHPSESSID=a8c3a9d95b6c8b2459b5a6dc0da76387 (accessed: 10th March 2009).

Zillmann, D. (1979). *Hostility and Aggression*. Hillsdale, NJ: Erlbaum.

Zillmann, D. (1988). Cognition-excitation interdependencies in aggressive behavior. *Aggressive Behavior, 14*, 51-64.

Zoričić, Z., Buljan, D., Thaller, V., Karlović, D., Barbir, A., Potkonjak, J., & Katinić, K. (2002). Structure of aggressive behavior in Croatian combat related chronic posttraumatic stress disorder patients. *Acta Clinica Croatic, 41*, 319-322.

Appendices

Appendix A: Systematic Review Search Syntax

Embase:

# ▲	Searches	Results
1	exp Military Veterans/	0
2	exp Military Personnel/	7354
3	exp Posttraumatic Stress Disorder/	16729
4	exp Violence/	41406
5	1 or 2	7354
6	3 and 4 and 5	119
7	limit 6 to (human and adult <18 to 64 years>)	67
8	from 7 keep 5, 10, 12-14, 17, 23, 27-30...	24
9	**from 8 keep 4, 9, 11, 13, 15-16, 22**	**7**

PsychInfo

# ▲	Searches	Results
1	exp Military Veterans/	5232
2	exp Military Personnel/	9478
3	exp Posttraumatic Stress Disorder/	15083
4	exp Violence/	42374
5	exp Alcoholism/ or exp Drug Abuse/	69585
6	1 or 2	14495
7	3 and 4 and 5 and 6	7
8	limit 7 to (human and adulthood <18+ years>)	6
9	3 and 4 and 6	87
10	limit 9 to (human and adulthood <18+ years>)	72
11	from 10 keep 1, 3, 5-6, 8-9, 12-15, 17-20...	42
12	from 11 keep 1, 4, 6-8, 11, 15-16, 20-21...	19

Medline

# ▲	Searches	Results
1	exp Posttraumatic Stress Disorder/	14964
2	exp Violence/	55793
3	Military Personnel/px [Psychology]	2560
4	1 and 2 and 3	53
5	limit 4 to (humans and "all adult (19 plus years)")	34
6	from 5 keep 3, 19-20, 22, 26-27	6

Appendix B: Quality Assessment Form

Quality Assessment Scoring Criteria

1.	Was the sample size large enough?	*n* =< 50: 0 *n* = 50-100: 1 *n* => 100: 2
2.	Is the sampling method biased?	Yes: 0 Some: 1 No: 2
3.	Were the groups comparable? (if applicable)	Yes: 2 Mostly: 1 No: 0
4.	Were the measures used validated?	Yes: 2 Some: 1 No: 0
5.	Were the measures objective?	Yes: 2 Some: 1 No: 0
6.	Were the same measures used for all participants?	Yes: 2 Some: 1 No: 0
7.	Was the analysis robust?	Frequencies, chi square – 0 t-test, ANOVA – 1 regression, structural equation modelling – 2
8.	Were controls used?	Yes: 2 Some: 1 No: 0
9.	Attrition rate?	None: 2 <25%: 1 >25%: 0
10.	Are the results generalisable?	Yes: 2 Some: 1 No: 0

Appendix C: Studies Removed

Studies Removed on the Basis of Inclusion/Exclusion Criteria

Table 12

Characteristics of Studies Removed on the Basis of Inclusion/Exclusion Criteria

Study # Authors (Year)	**Hypotheses or Aim**	**Variables**	**Comparison Group**	**Results**	**Conclusion**
Gerlock, A. A. (2004)	Describe factors related to Domestic Violence (DV) for men in a military DV programme and their completion/non-completion of the programme.	**IV:** Stress, self-esteem, alcoholism, drug abuse, PTSD, parental conflict tactics, relationship mutuality, age, employment, completers, non-completers. **DV:** Domestic violence.	None detailed.	PTSD was significantly correlated with frequency and severity of DV (p = 0.000, 2-tailed). Reports of parental DV significantly correlated with PTSD severity (p = 0.05, 2-tailed). Of demographics employment and age significantly distinguished completers and non-completers as well as court status and monitoring. PTSD, relationship mutuality, and symptoms of stress were all significantly different in completers and non-completers. No significant differences between the groups on the remainder of measures – substance misuse, reports of abusive behaviour, self-esteem, or witnessing parental DV.	Program completers were more likely to be younger than 35yrs, employed, higher relationship mutuality, lower stress and PTSD, and were not being monitored by courts. A link between DV and PTSD. Link between parental DV, PTSD and DV.

Study # Authors (Year)	Hypotheses or Aim	Variables	Comparison Group	Results	Conclusion
Glenn, D. M., et Al (2002)	Higher veteran reports of PTSD will be related to higher levels of hostility, violence and general psychological distress among partners and children. Higher veteran reports of combat exposure will be associated with higher levels of hostility, violence and general psychological distress among partners and children. Higher veteran reports of hostility and violence will be related to higher levels of hostility, violence and general psychological distress among partners and children.	**IV:** PTSD, combat exposure, family problems (current and family of origin). **DV:** Child punishment, hostility, partner and children PTSD.	None detailed.	Veterans reported high instance of childhood physical abuse. Veterans reported moderate-heavy levels of combat exposure and a high degree of PTSD symptoms. Hostility was also high in veterans. Veterans' means-scores on the VBI fell in the medium-high range.	Veteran's reports were consistent with prior research indicating elevated levels of family conflict and increased rates of hostility and interpersonal violence.

Study Removed on the Basis of Quality Assessment

Table 13

Characteristics of Study Removed on the Basis of Quality Assessment

Study # Authors (Year)	Hypotheses or Aim	Variables	Comparison Group	Results	Conclusion
Silva, J. A., et al. (2001)	To explore the psychiatric factors that appear to be linked with PTSD-related aggression among Vietnam combat veterans. Using case studies, propose a typology of psychopathological causes of PTSD-related aggression.	**IV:** PTSD **DV:** Violence	None detailed.	Four typologies established: Flashback associated violence – dissociative, amnesia, depersonalisation, derealisation, disturbances of self-concept, intense emotional responses, abnormal visual perceptions, abnormal sensory experiences, misidentification of others, fear, hostility, anxiety, location misidentification, impaired reality testing. Sleep disturbance associated violence – insomnia, non-purposeful flailing, defending self from danger in dream, unaware of actions, confusion on wakening, sleepwalking, violence associated with dream content, misinterpretation of reality, dream related, night terrors, dissociative. Mood lability associated violence – anger, hostility, regulation, affective arousal, impulsivity, coping styles, relating to others, cluster B personality disorder, overreacting to moderate stressors. Combat addiction violence – seeks to re-experience thoughts, feelings and actions related to previous combat experiences, action-	Proposed a preliminary classification of aggression in PTSD.

Study # Authors (Year)	Hypotheses or Aim	Variables	Comparison Group	Results	Conclusion
				addiction, craving dangerous, thrilling situations, a sense of pleasure, excitement, calmness or other mental state for temporary sense of wellbeing, decrease in anxiety, tension, emptiness, numbness, feeling alive, no loss of contact with reality, harm not specific, recreate combat experience.	

Table 14:

Quality Assessment of Study Removed on the Basis of Quality Assessment

Study # Authors (Year)	Sample	Controls	Measures	Attrition Rate	Analysis	Limitations	Q A Score
Silva, J. A., et al. (2001)	4 case studies, men with combat experience and active PTSD symptoms. Age – 47.	None detailed.	Case Studies.	N/A	Qualitative analysis – typology development.	Potential for malingering. Very low sample number. No information regarding selection. No recognised methodology.	5