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TOWARDS CREATING A TECHNOLOGY-ENABLED INTERVENTION TO TREAT PTSD
IN MILITARY VETERANS

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Abstract

Traumatic stress caused as the result of a military career is a widely researched phenomenon. Posttraumatic Stress Disorder (PTSD) can develop when traumatic stress in individuals is not moderated and managed well. A wider variety of psychological interventions for treating PTSD have been researched since PTSD became a clinical diagnosis. However, with new and emerging technologies, as well as an increasingly technical and digital world, more research is needed to establish if technology can be successfully utilized in treating PTSD. The aim of this PhD was to investigate the perception and effectiveness of a technology-enabled intervention to help treat PTSD in UK military veterans. This intervention would take into account veteran experiences with interventions they have already undertaken. To achieve this, four studies were conducted overall. The first was a systematic review of the literature relating to individual psychological intervention for PTSD; a total of 11 studies were included in the review. The interventions from the 11 studies were broken down into three categories. Interventions across all studies were found to be effective. Further analysis of studies using military personnel as participants was conducted and found the CPT was the intervention method used to successfully reduce PTSD symptoms for this population. Analysis of studies which utilised technology to deliver the intervention was also conducted, all of these studies used Computerized Cognitive Behavioural Therapy to successfully reduce PTSD symptoms in the participants. The second study was qualitative research comprising semi-structured interviews with 12 veterans, asking questions on their perception of psychological treatment they had received for PTSD. The results showed that there were more positive opinions than negative opinions relating to the interventions that participants had experienced. However, all participants stated that they would be willing to try a technology-enabled intervention if it was available. The third study was a longitudinal study with a total of 98 participants taking part over a 27 month period. The aim of this longitudinal study was to

establish the effectiveness of the technology-enabled intervention in reducing PTSD symptoms. The technology-enabled intervention was found to be significantly effective in reducing both PTSD symptoms overall and at a PTSD criterion level. The fourth and final study was qualitative research consisting of semi-structured interviews with 17 veterans. The questions asked related to their perceptions of the technology-enabled intervention experienced as a part of study three. Results showed that, overall, participants were satisfied that the intervention reduced their PTSD symptoms. However, there were some aspects of the intervention that they felt could have been better designed, including increasing the number of images in the intervention sessions or creating more interactive sessions. Overall, conclusions of the studies found that even though technology-enabled intervention were found to be effective at reducing PTSD symptom scores, there are improvements that can be made to increase its usability and effectiveness. Further research is required to improve the technology-enabled intervention, develop additional functionality and test its effectiveness in a randomised controlled trial.

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List of Acronyms and Abbreviations

ANOVA	Analysis of Variance
APA	American Psychological Association
BPS	British Psychological Association
CAPS	Clinically Administered PTSD Scale
CASP	Critical Appraisal Skills Programme checklist
CBCT	Cognitive Behavioural Conjoint Therapy
CBT	Cognitive Behavioural Therapy
CCBT	Computerized Cognitive Behavioural Therapy
CEQ	Combat Experiences Questionnaire
CES	Combat Exposure Scale
CPT	Cognitive Processing Therapy
CR	Cognitive Restructuring Therapy
CT	Cognitive Therapy
DRRI-2	Deployment Risk and Resilience Inventory Revised version
DSM	Diagnostic and Statistical Manual
DVA	Department of Veteran Affairs
EBP	Evidence-based Practice
EMDR	Eye-movement Desensitisation and Reprocessing
ET	Exposure Therapy
ICD	International Classification of Diseases
IES-R	Impact of Events Scale - Revised
IPA	Interpretative Phenomenological Analysis
LEC-5	The Life Events Checklist-5
M-PTSD	Mississippi Scale for Combat-Related PTSD
MANOVA	Multivariate Analysis of Variance
MBCT	Mindfulness-based Cognitive Therapy
MoD	Ministry of Defence
MRC	Medical Research Council

NEF	New Economics Foundation
NET	Narrative Exposure Therapy
NHS	National Health Service
ONS	Office for National Statistics
PCL-5	Posttraumatic Stress Disorder Checklist for DSM-5
PDS	Posttraumatic Stress Diagnostic Scale
PE	Prolonged Exposure
PhD	Doctorate of Philosophy
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PTSD	Posttraumatic Stress Disorder
RCT	Randomised Controlled Trial
SLESQ	Stressful Life Events Screening Questionnaire
SPSS	Statistical Package for the Social Sciences
TF-CBT	Trauma-focused Cognitive Behavioural Therapy
THQ	Trauma History Questionnaire
TLEQ	Traumatic Life Events Questionnaire
UK	United Kingdom
VRET	Virtual Reality Exposure Therapy
WEMWBS	Warwick-Edinburgh Mental Well-being Scale
WHO	World Health Organisation
WWI	World War One
WWII	World War Two

Chapter 1: Trauma, Posttraumatic Stress Disorder and Interventions to Treat Posttraumatic Stress Disorder, a History and Future

1.1. Introduction

Workplace wellbeing and health, with a particular focus on the psychological effects on individuals who have been exposed to traumatic events, started to re-emerge into the foreground of research around 1998 (Rick, Perryman, Young, Guppy & Hillage, 1998). Exposure to (either witnessing or experiencing) traumatic events can lead to the development of traumatic stress (Babson & Feldner, 2010). The definition of a traumatic event was recently aligned to what is required for a clinical diagnosis and is now the exposure to serious injury, threatened death or sexual violence (Benjet et al., 2016). If certain conditions exist before, during and/or after exposure to a traumatic event it can lead to the development of posttraumatic stress disorder (PTSD; Rick & Briner, 2004).

There are a number of service professions that have been identified as having a higher than normal risk of exposure to traumatic events (McFarlane & Bryant, 2007) due to the nature of the 'business as usual' job tasks. Professionals working in the military, medical services, emergency services, social services and transport services often report feelings of threat to self, witnessing death, and/or witnessing or experiencing horrific injury (McFarlane & Bryant, 2007). Therefore, these have been identified as high risk professions and have generated the highest amount of academic interest in the trauma field (Javidi & Yadhooahie, 2012; McFarlane & Bryant, 2007). Research highlights that personnel serving in war zones are most likely to experience higher the normal levels of traumatic than other professions and even within the military (Vinokur, Pierce, Lewandowski-Romps, Hobfoll & Galea, 2011). Specifically with personnel serving in war zones, it is individuals who are frontline soldiers and therefore engage in combat every day who show the largest prevalence of PTSD and anxiety disorders (Javidi & Yadhooahie, 2012).

When considering military specific careers (in particular wars and battles), many more military personnel are returning from war zones with serious physical, mental and spiritual damage than in previous years (Watson, 2008). War in itself has changed significantly with technological and scientific advances being made, changing war strategy and approach. (Shaw, 2015; Yehuda, Vermetten, McFarlane & Lehrner, 2014). This has resulted in changes to the casualties and injuries incurred as a result of modern wars (Yehuda et al., 2014). The advances in medicine, technology and medical technology have helped to improve medical professionals' ability to diagnosis and treat (Lundberg & Alexanderson, 2007). This has resulted in many surviving where they would not have done in the past. These facts, coupled with the fact that events (traumatic and non-traumatic) that military personnel are being exposed to have become more complex in nature, has increased the risk of military personnel in war zones surviving physical and psychological trauma and therefore developing PTSD (Ramchand et al., 2010).

In military health research, the difference between wars, conflicts and battles is not considered or differentiated between in the same way that it is in international law. By definition, a battle is a "A sustained fight between large organized armed forces" (Oxford English Dictionary Online, 2018, n.p), it should be noted that definitions provided in the Oxford English Dictionary are not legal definitions. A conflict is "A prolonged armed struggle" Oxford English Dictionary Online, 2018, n.p). A war is "A state of armed conflict between different countries or different groups within a country" (Oxford English Dictionary Online, 2018, n.p). According to International Law, the UK was not at 'war' with either Iraq or Afghanistan. Yet, the academic military health research often refers to both of these conflicts as wars (e.g Fear et al., 2010; Hines, Sundin, Rona, Wessely & Fear, 2014). There are also differences in combat zones (i.e intensity of the combat; Lujala, 2009) that are not always accounted for. However, the differences

highlighted in this paragraph do not change the link between the traumatic event and response to that event.

1.2. Trauma

The online Oxford English Dictionary (2017) defines trauma as “a deeply distressing or disturbing”, “emotional shock following a stressful event or a physical injury, which may lead to long-term neurosis” or “physical injury”.

However, for clinical purposes, the definition is different. Trauma in the clinical literature (and accurate as of The Diagnostic and Statistical Manual [DSM] version 5; Briere & Scott, 2014) is defined as:

“Exposure to actual or threatened death, serious injury, or sexual violence in one (or more) of the following ways: (1) Directly experiencing the traumatic event(s); (2) Witnessing, in person, the event(s) as it occurred to others; (3) learning the traumatic event(s) occurred to a family member or close friend – in cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental; (4) experiencing repeated or extreme exposure to aversive details of the traumatic event(s) (e.g., first responders collecting human remains; police officers repeatedly exposed to details of child abuse) (Note: Criterion A4 does not apply to exposure through electronic media, television, movies, or pictures, unless this exposure is work related).” (p. 9)

It is the above definition of trauma which will be used in this PhD. Research into trauma has shown that most people in the western world will suffer at least one trauma in their life (Briere & Scott, 2014). This trauma is ubiquitous and can

occur at any time (Briere & Scott, 2014). The World Mental Health Surveys suggest that 70% of the general population will be exposed to a traumatic event in their lifetime (Koenen et al., 2017). This figure will vary in a clinical population.

There are two types of trauma noted in the literature. These are 'Type I' and 'Type II' (Sage, Brooks & Greenberg, 2017). Type I trauma is a single, discrete traumatic event, and Type II trauma is the result of exposure to repeated trauma (Sage et al., 2017). Traumatic events are also broadly categorised according to whether they are 'natural' or 'man-made' (Brown et al., 2017). Within these two categories there are numerous types of specific events that have been attributed to causing posttraumatic stress. Some of these include child abuse, sexual abuse, witnessing murder or suicide, violence, and war (Briere & Scott, 2014). War trauma in particular is considered a powerful source of trauma. The reason given for this in the available literature is that combat can (and often does) involve a high number of repeated exposure to different types of trauma (Briere & Scott, 2014), including those listed above. The compound effects of multiple traumas increase the probability of experiencing lasting personal effects of trauma.

Experiencing a traumatic event, as previously mentioned, can result in the development of traumatic stress (Kubany, Ralston & Hill, 2010). Traumatic stress is defined as stress that is caused as a result of experiencing a traumatic event (Kubany et al., 2010). Exposure to trauma can result in many different types of response based on individual differences in those experiencing trauma (Kubany et al., 2010). These responses are known as posttraumatic stress symptoms (Kubany et al., 2010). Responses range from mild and temporary impairment that reduces over time, to issues that manifest in personality disturbances and incapacitating symptomatic presentations (Kaminer & Eagle, 2017).

While high numbers of the individuals are predicted to experience traumatic stress in their lifetime, it is only a small percentage of individuals who go on to develop stress-related conditions as a result of these experiences (Briere, Scott & Jones, 2014). A normal reaction to an abnormal event is complex and results in changes in attention, arousal, emotion and perception leading to an individual taking actions to manage their emotions and reactions (Herman, 2015). When an individual is unable to take mitigating action, it results in pathological and lasting changes to arousal, emotion, memory and cognition which can lead to the development of traumatic stress (Herman, 2015).

Posttraumatic stress symptoms in many individuals often reduce without intervention (Frueh, Grubaugh, Elhai & Ford, 2012). Research shows that 50% of individuals will remit within 3 months without receiving any treatment (Frueh et al., 2012). As a result, the UK National Institute for Health and Care Excellence recommends one month of 'watchful waiting' in its published PTSD management guidelines (Greenberg & Wessely, 2017). However, if symptoms do not reduce posttraumatic stress can develop into PTSD (Rick & Briner, 2004). This development into PTSD can take years and is often not recognized by the individual experiencing it (Rick & Briner, 2004). The clinical term for the time it can take to develop a mental health condition is 'delayed onset', for PTSD this is a minimum of six months between the traumatic event and PTSD development (Horesh, Solomon, Zerach & Ein-Dor, 2011). Statistics on PTSD prevalence is estimated to be higher than what is reported due to reasons such as unreported, unrecognised or misdiagnosed mental health conditions (Sparr, 2015). Understanding and communicating any changes to personal health becomes more important at this stage.

1.3. A History of PTSD

PTSD is a serious mental health condition that results in impaired occupational functioning, social functioning and quality of life (Blount, Fredman, Pukay-Martin, Macdonald & Monson, 2014). There are significant changes to biological and psychological processes reported in an individual with PTSD (McGuire, Lee & Drummond, 2014). Over four decades ago PTSD changed trauma and traumatic stress studies (Frueh et al., 2012). Prior to the introduction of PTSD to clinical practice, the concept of trauma and stress did exist, but in a variety of different guises. These will be explored further in this section.

An early labelling of PTSD was 'soldiers heart', which was defined as a psychological disturbance resulting from combat exposure (Phelps, Wade & Forbes, 2016). Time progresses to World War One (WWI) where military personnel who exhibited traumatic stress reactions were labelled with a variety of terms including: 'shell shock' (Phelps et al., 2016); 'effort syndrome'; 'gas hysteria'; or 'war neurosis' (Campsie, Geller & Campsie, 2006). Shell shock alone was considered to be caused by physical damage to the brain as opposed to a psychological damage (Phelps et al., 2016).

During World War Two (WWII) and as a result of the Korean War, knowledge and understanding of PTSD progressed to become known as either 'combat fatigue' (Phelps et al., 2016); 'psychoneurosis'; 'operational fatigue'; or 'battle fatigue' (Campsie et al., 2006). It was during the next iteration, as a result of the Vietnam War, that the word stress was added and it began to resemble more closely what is now known as PTSD. The Vietnam War referred to PTSD as 'combat stress' or 'posttraumatic stress syndrome' (Campsie et al., 2006). It was the Vietnam veterans' struggle for formal acknowledgement that their combat experiences were the cause of their poor mental health that the clinical population began to acknowledge that something needed to be done. This push for formal

acknowledgement was instrumental in PTSD being classified as a psychiatric diagnosis and therefore inclusion into the Diagnostic and Statistical Manual (DSM) (Phelps et al., 2016).

There are two classifications systems for psychiatric diagnostic purposes: The DSM and The International Classification of Diseases (ICD; Andrews, Slade & Peters, 1999). It was only 37 years ago, in 1980, when the American Psychiatric Association (APA) released the version of the DSM (DSM-III; Jones & Wessely, 2007) that contained an official and operational diagnosis for PTSD. The World Health Organization (WHO) included PTSD into their equivalent the ICD version 10 (ICD-10) in 1992 (Larsen & Pcaella, 2016). Even though the ICD was designed for global use whilst the DSM was derived from an American population, studies published on PTSD suggest that the DSM is the most widely used in research. Figure 1 shows a chronological timeline of PTSD.

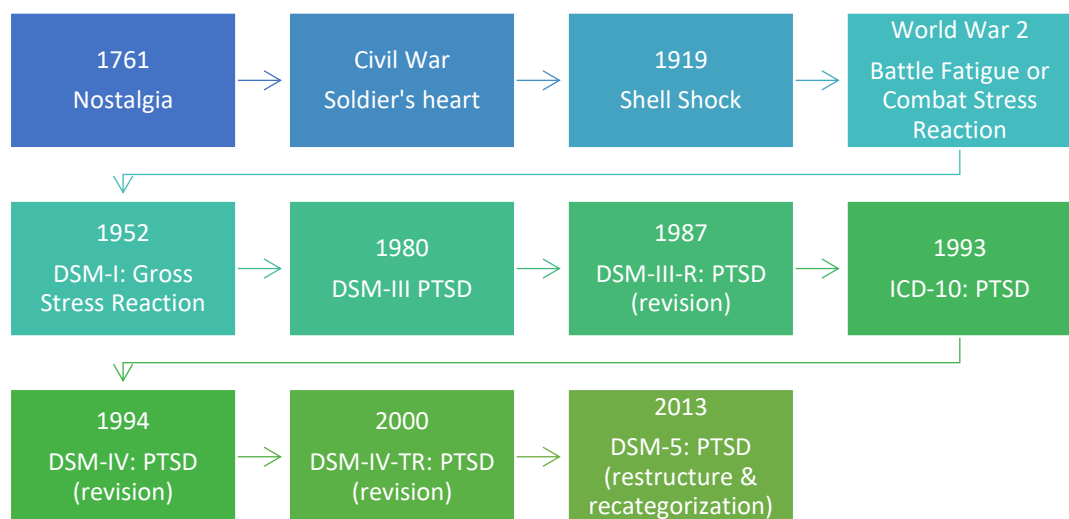


Figure 1. Chronological Timeline of PTSD

1.3.1. The DSM

The DSM is an official classification scheme and standardisation of mental illness and disorders (Greco, 2016). It was created to aid in diagnosing mental health problems and is relied upon by clinicians and researchers (Greco, 2016). PTSD is a unique diagnosis from the other mental health problems in the DSM as it is the only one that requires a precipitating traumatic event (Brown et al., 2014). While there are only three versions of the DSM that include PTSD as a diagnosis, there have been five versions published overall (Frueh et al., 2012). PTSD has evolved steadily throughout each iteration of the DSM since its inclusion in 1980 (Frueh et al., 2012).

DSM version 1 (DSM-I), published in 1952, did not include PTSD as it is now understood (Scott, 1990). However, a temporary diagnosis was added specifically as a reaction to the effect on soldiers of WWII (Scott, 1990). This was added to DSM-I as 'gross stress reaction' (Scott, 1990). This can be assumed to be a starting point of recognition of traumatic stress. In DSM-II 'gross stress reaction' was removed from the manual entirely without a similar replacement to account the symptoms of 'gross stress reaction' (Scott, 1990). This is in line with gross stress reaction being included in DSM-I as a temporary reaction to external and political pressures. There was no reference to any form of gross stress reaction or PTSD in DSM-II, published in 1968 (Scott, 1990).

DSM version 3 (DSM-III) was the first version of the DSM to include PTSD as a permanent item (has not been removed from all subsequent versions of the DSM) in the manual (Jones & Wessely, 2007). The revised version of DSM-III, the DSM-III-R, was released in 1987. PTSD criterion was largely the same as in DSM-III, the only change was in the stressor criteria (March, 1993). Specifically, the stressor criteria were redefined in DSM-III to include experiencing intense fear, helplessness and terror, as well as the experiencing of a stressor can include

hearing about or seeing an event, not only direct experience of the event (March, 1993). The other change to the stressor criterion is the addition of qualifying events and dimensions of the experience (self-perception of the event; March, 1993). When DSM-III was being written, there was a wide variety of names like 'Post-Combat Disorder' being proposed as the diagnostic category for PTSD (Scott, 1990). PTSD was eventually settled upon as it encompassed all the symptoms identified and allowed for circumstances outside of combat and war such as natural disasters or other man-made events (Scott, 1990).

Within the metastructure of DSM-III, PTSD was classified under 'anxiety disorders' (Friedman, 2013). The diagnosis was split into five distinctive criterion, each with a category letter (in this case starting with 'A'; Scott, 1990) with specific symptoms falling within each category (Scott, 1990). These five were:

- (A) experiencing a traumatic event
- (B) the traumatic event is consistently re-experienced in a number of specific ways
- (C) avoidance
- (D) increased arousal
- (E) symptoms of at least one month (APA, 1987)

There were a total of 12 underlying symptoms for PTSD across all categories (Friedman, Resick, Bryant & Brewin, 2011).

DSM version 4 (DSM-IV) was published in 1994 (APA, 1994) and revised in 2000 to the DSM-IV-TR (APA, 2000) and is currently the longest standing version of the DSM. PTSD was still included in DSM-IV, however a few changes were made to the diagnosis. The metastructure that PTSD was under remained 'anxiety disorders' (Friedman, 2013), the changes made were related to diagnosis criterion categories (Friedman et al., 2011). The diagnosis became:

- (A) experiencing a traumatic event

- (B) Re-experiencing symptoms
- (C) Avoiding symptoms
- (D) Hyperarousal
- (E) Duration of at least one month
- (F) causes significant stress or functional impairment (Friedman et al., 2011).

It can be argued that the most significant change was the addition of the new category (F), whereby symptoms experienced causes significant stress or functional impairment was added (Friedman, 2011).

DSM version 5 (DSM-5) was published in 2013 (APA, 2013). There were significant changes made to PTSD in this version of the DSM, a summary of which can be seen in Table 1. PTSD in DSM-5 is under a metastructure of 'trauma and stress-related disorders' (Friedman, 2013). In the aforementioned metastructure, all symptoms are the result of an aversive event (Friedman, 2013). For PTSD specifically, the aversive event must also be traumatic (Friedman, 2013). Criterion are:

- (A) The person was exposed to: death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence, as follows: 1. Direct exposure, 2. Witnessing, in person.
- (B) presence of intrusion, negative mood, dissociative, avoidance, arousal symptoms
- (C) duration of the symptoms lasting for at least 1 month after trauma
- (D) cause clinically significant distress or functional impairment
- (E) symptoms are not due to physiological effects of alcohol, drugs, or medication (Briere et al., 2014).

Table 1.

Changes to the Diagnostic Criteria of PTSD Between DSM IV and DSM-5

<u>Aspect</u>	<u>DSM-IV</u>	<u>DSM-5</u>
Metastructure	Anxiety Disorders	Trauma and Stress Disorder
Traumatic Event Definition	Intense fear, helplessness, or horror as a result of an incident	Exposure to serious injury, threatened death or sexual violence
Symptom Clusters	3	4
Criterion numbers	6	5

1.3.2. ICD

The ICD is used as an international standard for reporting health conditions and diseases and is a diagnostic classification standard for clinical and research practice (WHO, 2016). The first version of the ICD was published in 1893, by the International Statistical Institute (WHO, 2016) and was called the 'International List of Causes of Death' (WHO, 2018b). It was only when version 6 was published in 1948 that the WHO were the creators (WHO, 2016) and incorporated morbidity for the first time (WHO, 2018b). The ICD was then called 'The International Statistical Classification of Diseases, Injuries and Causes of Death' (WHO, 2018a). The latest published version is ICD-10 and was released in 1990, but ICD-11 is due for release in 2018 (WHO, 2016).

The definition of PTSD in ICD-10 is a reaction to severe stress (O'Connor, Lasgaard, Spindler & Elklit, 2007). The diagnosis falls within the five criterion of:

- (A) the stressor is likely to cause severe distress in almost anyone;
- (B) re-experiencing of the traumatic experience or severe discomfort when recalling the event
- (C) avoidance of the traumatic experience

(D) either a level of inability to recall important parts of the experience or two symptoms of increased arousal from the list provided
(E) criteria b, c and d occur within 6 months of the traumatic experience
(O'Connor et al., 2007).

The WHO has put forward a proposition for PTSD and complex PTSD to be included in ICD-11 (Brewin, Bryant & Maercker, 2013; O'Connor et al., 2007). PTSD and complex PTSD will be 'sibling disorders' (Cloitre, Garvert, Brewin, Bryant & Maercker, 2013). Diagnosis for PTSD in ICD-11 is suggested to include six symptoms with three core elements of: (1) Re-experiencing the traumatic events with emotions of fear or horror; (2) avoidance; (3) sense of threat resulting in hypervigilance or enhanced startle reaction (Cloitre et al., 2013).

1.3.3. The DSM versus the ICD.

There are many similarities between the ICD and the DSM when it comes to PTSD diagnosis, however there are a few main differences. A key difference is in the definition of the traumatic event. The ICD-10 definition is more all-encompassing for a traumatic event than that of the DSM-5. Specifically, the DSM contains criteria of symptoms lasting more than one month, more prominence on avoidance and arousal, and includes impairment of function (Friedman, 2016). Further, despite the fact that PTSD was added to the ICD three years later than it was included in the DSM, there were still significant differences between the two when ICD-10 was published (O'Connor et al., 2007). Research conducted comparing DSM-IV with ICD-10 showed that only 37% of individuals that fulfilled the PTSD criteria in ICD-10 also met the criteria stated in DSM-IV (O'Connor et al., 2007). This discrepancy highlights the differences in the two manuals.

Evidence based treatments and research for PTSD are more heavily reliant on the DSM (O'Connor et al., 2007). No specific reason can be given for this, however

there is a suggestion that there is less endorsement for ICD-10 as a result of the re-experiencing criterion of the ICD (Hyland et al., 2016). Perhaps it is the fact that the DSM was the first to be issued, which resulted in it being given more weight. While there is no definitive reason for the popularity of the DSM, this research will focus on articles published using the DSM as it was published for academic research purposes and represents a higher percentage of the available academic literature. As a result, PTSD diagnosis criteria used for this PhD will be that of the DSM.

Prevalence rates of PTSD in the general population varies based on countries and population types. In America, lifetime rates ranged between 12.8% – 46%, in the UK and Israel rates range between 8.6% - 11.8% (Spinoven, Penninx, van Hemert, Rooij & Elzinga, 2014), and in European samples rates ranged between 0.5% - 2.32% (Juul & Nemeroff, 2012). What is not seen from these prevalence rates is that PTSD is a very individual experience with symptom presentation varying between individuals (Steenkamp et al., 2015). There are, however, patterns that emerge in symptom experiences based on the type of trauma and the time leading to PTSD development (Steenkamp et al., 2015).

1.3.4. Comorbidity of PTSD.

Mental health conditions are often co-occurring with other mental health conditions as well physical effects (Krueger & Markon, 2006). In the mental health field, this is known as comorbidity (Krueger & Markon, 2006). PTSD is regularly complicated by other mental health problems (Stander, Thomsen & Highfill-McRoy, 2014). The reason that comorbidity is widely studied and important to consider when diagnosing mental health conditions is due to the increased negative health consequence on the individual (Adams et al., 2015). Comorbidity also complicates the ability to identify, assess, diagnose and treat mental health disorders (McGuire et al., 2014). There are a high number of

combinations of comorbid conditions that can be experienced with PTSD. This section will cover only a few key comorbid conditions in detail.

A comorbidity survey conducted in 2013 found that 85% of those suffering from PTSD also suffered from at least one other mental health condition (Teng et al., 2013). Of this 85%, roughly 50% of individuals experienced 3 or more diagnosed psychiatric conditions which equated to 43% of the sampled population (Teng et al., 2013). Gender has been found to be associated with comorbidity, with 88.3% of men and 79% of women experiencing comorbid conditions (Galazter, Nickerson, Litz & Marmar, 2013). In a civilian population comorbidity ranged from 8% (McFarlane & Papay, 1992) to 32% (Craske et al., 2006).

Research into PTSD comorbidity across many decades has consistently found that panic disorders, high rates of emotional dysfunction (White & Barlow, 2002), anxiety conditions, depression (Teng et al., 2013) and substance abuse (Milliken, Aucherlonie & Hoge, 2007) most commonly co-occur with PTSD. Panic disorder, in particular, has been found to be one of the most prevalent comorbid conditions present with PTSD (Teng et al., 2013).

Anxiety conditions that are the most researched in conjunction with PTSD include: phobic anxiety (Briere et al., 2014); panic disorder; generalized anxiety, and obsessive compulsive disorders (Teng et al., 2013). Anxiety and PTSD comorbidity shows rates of 39% to 97% (Spinoven et al., 2014). Depression (specifically major depression), psychotic depression (major depression with psychotic features) and psychosis have also been found to be highly comorbid with PTSD (Briere et al., 2014). Comorbidity of PTSD with depression has been found to range from 21% to 94% prevalence (Spinoven et al., 2014). Diversity of comorbid conditions may be explained by the different population types or different sources of trauma.

A systematic review conducted in 2014 found a high prevalence of alcohol misuse in those with PTSD, with a range between 9.8% and 61.3% (Debell et al., 2014). Research has also shown that substance use disorder (which does not include alcohol abuse) has a lifetime prevalence rate of 19% - 35% (Roberts, Roberts, Jones & Bisson, 2015). Substance abuse as a comorbid condition with PTSD appears to occur in higher rates in men than in women (Roberts et al., 2015).

There are many theories as to why the conditions above co-occur so commonly with PTSD. However, an overriding theory has yet to be found or agreed upon in the current literature. There is evidence in scientific research suggesting that experiencing PTSD can increase the risk for developing generalised anxiety disorders, substance use problems, depression and specific phobias (Babson & Feldner, 2011). This increased risk could be a potential reason for the high rates of comorbidity with PTSD. It has been postulated that PTSD has a high level of linked psychiatric conditions because the diagnosis is linked to experiencing a traumatic event (Babson & Feldner, 2011), which is unique to PTSD, and therefore acts as the trigger or incubator for other psychiatric conditions.

1.3.5. Issues, risks, predictors and protective factors of PTSD.

There are a number of well documented issues resulting from PTSD that have been reported by those who have been diagnosed with PTSD. Firstly, PTSD often results in very serious occupational and interpersonal issues (Koenen et al., 2017). This often leads to friendship, romantic relationship and family problems (Lambert, Engh, Hasbun & Holzer, 2012). Specific issues that have been documented from an interpersonal perspective include taking part in school activities with their children, jealousy, disconnection from the outside world, destructiveness and withdrawal (Dekel & Monson, 2010).

From a business and economical perspective, it is estimated that PTSD results in lost business productivity of 3.6 days per month (Koenen et al., 2017).

Additionally, in 85% of cases often present with another mental health condition (Teng et al., 2013) and therefore sufferers often are required to manage the impact of at least two conditions. Managing two or more conditions puts additional strain on their everyday ability to cope (Foa, Keane, Friedman & Cohen, 2009). This directly impacts on personal wellbeing (Foa et al., 2009).

Beyond striving to understand the personal and interpersonal issues that are experienced every day by those suffering from PTSD, extensive research has been conducted into the predictors and mitigating factors of PTSD manifestation. This literature indicates that there are a number of risks factors and individual differences in vulnerabilities that are strong predictors or mitigating factors for PTSD developing or not (Freuh et al., 2012).

Risk factors can be split into three groups of 'pre-', 'peri-' or 'post-' incident factors (Iversen et al., 2008; Phelps et al., 2016). Pre-trauma factors are those that exist before the traumatic event that results in PTSD development takes place (Iverson et al., 2008). Peri-trauma factors are those that occur at the same time as the traumatic event (Phelps et al., 2016). Post-incident factors are those that occur after the traumatic event that was the cause of an individuals' PTSD (Phelps et al., 2016).

Iversen et al (2008) researched risk factors on military personnel and categorised these into these three factor groups. The factors listed here are non-specific to a military population. Pre-trauma factors are postulated to include childhood trauma, family mental illness, previous psychiatric conditions (Brewin, Andrews & Valentine, 2000), history of prior trauma, previous psychological problems (Ozer, Best, Lipsey & Weiss, 2003), and negative parenting experiences (Xue et al.,

2015). Peri-trauma factors include predictability of the traumatic event, ability to control the event, severity of exposure to the event (Iversen et al., 2008; Phelps et al., 2016) and/or perceived level of personal threat (Ozer et al., 2003; Iversen et al., 2008; Phelps et al., 2016). Post-incident factors are those that occurred after the affecting traumatic event (Phelps et al., 2016). These include vulnerability, individual appraisal of the trauma, perceived threat to life (Iversen et al., 2008), lower levels of social support, other life events at the time (Phelps et al., 2016) and type of social response (accepting or rejecting the individual; Briere et al., 2014).

Meta-analysis conducted by Brewin et al., (2000) found that only risk factors of childhood abuse, family psychiatric history and personal psychiatric history show uniform affect across all studies included. Additionally, Brewin et al., (2000) found that age at trauma, gender and race risks were not risk factors in certain studies included. Ozer et al., (2003) look at risk factors of PTSD in a Meta-analysis taking into account the meta-analysis conducted by Brewin et al., (2000) also found while there are some risk and protective factors, these only help to predict PTSD in a maximum of 20% of cases (Ozer et al., 2003).

Gender is a biological risk factor of PTSD, with lifetime prevalence rates for females being reported at 10.1% and for males reported at 4.9% (Juul & Nemeroff, 2012). These statistics provide evidence that females are more than twice as likely to develop lifetime PTSD than men, which is an outcome that is supported by many research papers including research by Freuh et al., (2012). The difference above does not alter based on the type of trauma experienced by the individual (Juul & Nemeroff, 2012). There is no definitive reason for the gender difference seen. There are some studies that suggest that is to do with the hormonal differences in males and females (Juul & Nemeroff, 2012). From a

genetics standpoint, Hispanics and African-Americans are at higher risk than Caucasians to develop PTSD (DiGrande, Neria, Brackbill, Pulliman & Galea 2010).

Personality has a large impact on predicting if PTSD will develop after an individual experiences a traumatic event (Phelps et al., 2016). Those with anxious personalities are more likely to develop PTSD (Phelps et al., 2016). When broken down into dimensions of personality, higher scores of extraversion and neuroticism are reported to be risk factors for development of PTSD (Spinhoven et al., 2014). Those with lower levels of intelligence have been shown to be at higher risk of developing PTSD (Freuh et al., 2012). A poor ability to adjust to new social situations also increases the likelihood of PTSD onset (Freuh et al., 2012; Iversen et al., 2008).

There are also demographic risk factors for developing PTSD. One is age. The risk of developing PTSD is greater with lower (Iversen et al., 2008) and older age (McCutcheon et al., 2010). Specifically, those identified as young (20-34 years old) or middle aged (35-64 years old) were also found to have significantly higher lifetime PTSD prevalence rates (4.3% and 5.2% respectively) than adults older than 65 (2.6%; Reynold, Pietrzak, Mackenzie, Chou & Sareen, 2016). Other demographic variables such as lower levels of education and lower socioeconomic status have been found to increase the development of PTSD (Freuh et al., 2012).

The characteristics of a trauma can have significant predictive effect on the subsequent development of PTSD. Characteristics that have been found to increase the likelihood of subsequent PTSD development include: intentional acts of violence (Briere & Elliot, 2000); life threat (DiGrande et al., 2010); physical injury (Haden, Scarpa, Jones & Ollendick, 2007); trauma exposure, and trauma length or duration (Naeem et al., 2011).

There are a number of protective factors against PTSD development that have been published in the academic literature. Protective factors are those that mitigate the effects of the traumatic event and reduce the risk of PTSD developing post-trauma (Yuan et al., 2011). High levels of social support has been found to reduce the risk of PTSD developing in many studies (Andrews, Brewin & Rose, 2003; Iversen et al., 2008). Higher levels of resilience (the ability to recover from negative experiences) has been found to reduce the likelihood on PTSD onset (Yuan et al., 2011). Higher levels of social functioning (including emotional regulation) was also found to reduce the risk of PTSD development (Yuan et al., 2011).

1.3.6. Trauma and PTSD in military personnel.

The UK military consists of three services The Army, The Royal Air Force and The Navy. In the UK, each service has their own history, rank system and culture. Once discharged from the UK military you become known as a Veteran. According to the Ministry of Defence (MoD), in the UK veterans are defined as “anyone who has served for at least one day in Her Majesty’s Armed Forces (Regular or Reserve) or Merchant Mariners who have seen duty on legally defined military operations” (MoD, 2017, p. 2). While this term is contentious and varies between countries (Dandeker, Wessely, Iversen, & Ross, 2006), this PhD will be using the official MoD definition. It is argued that military experiences of trauma cannot be compared to civilians as civilians often experience trauma through accidents or natural disasters as opposed to exposure to deliberate violence (Larner & Blow, 2011).

1.3.6.1. PTSD in military personnel.

Military personnel are highly likely to experience higher than normal levels of trauma and traumatic stress (Vinokur et al., 2011), thus showing higher

prevalence rates of PTSD (Javidi & Yadhooahie, 2012). This has become an increasingly prevalent issue with military operations running since 2002 in Iraq and Afghanistan (Murphy, Hunt, Luzon & Greenberg, 2014). The number of military personnel experiencing war zones and multiple deployments to high-intensity combat zones has and is continuing to increase (Possemato et al., 2014). Numbers of military personnel experiencing war zones has reached an estimated 1.65 million plus in 2014 (Possemato et al., 2014). The lag time in seeking treatment for PTSD was reported to be 11.8 years in 2015 (Murphy et al., 2015).

It is worth noting here that the word 'events' rather than 'event' is often used with military research into PTSD. The significance of this is that PTSD diagnosis criterion A specifies exposure of a single traumatic event. In military service there is a strong likelihood of being exposed to multiple traumatic events from both combat and non-combat sources (Phelps et al., 2016). An additional risk factor is that military personnel often seek to return to operational duty (Yehuda et al., 2014). Returning to the source of the traumatic experience voluntarily and willingly repeatedly throughout their military career (Yehuda et al., 2014) is a fundamental difference between military and civilian PTSD (Yehuda et al., 2014). This is a key difference to be mindful of during research, diagnosis and treatment.

It has been highlighted in various studies that an estimated 79% of all military personnel experience traumatic events (Babson & Feldner, 2010). Research conducted in 2012 found that 20% of these individuals' experience PTSD symptoms that could result in a premature discharge from active duty, and in some cases even military service (Sherman, Perlick & Straits-Tröster, 2012). Within the military veteran population PTSD prevalence studies found that 37% - 39% of veterans' experience PTSD symptoms to the extent that would be clinically diagnosable (Possemato et al., 2014). Andrews, Brewin, Stewart, Philpott & Hejdenberg, (2009) reported in a study that included those accessing

combat stress, reported that delayed onset PTSD is 33% more common in veterans and that delayed onset clinical symptoms are likely to occur 18 months after being discharged from the military. Given these statistics it is important to understand PTSD in military personnel, especially as veterans are reluctant to seek treatment if they are experiencing PTSD symptoms (Hoge et al., 2004). What must be noted is that research has indicated that there is also a tendency for military personnel to exaggerate the psychological impacts of their military service (Jones & Milroy, 2016). A combination of delayed onset PTSD, non-reported PTSD, un-diagnosed PTSD, incorrectly diagnosed PTSD and exaggerated trauma impacts, mean that an exact figure for PTSD prevalence in the military and military veterans is not available.

The National Vietnam Veterans Readjustment Study (NVVRS) conducted research in 1990 that reported that 30.9% of veterans from the Vietnam War developed PTSD and 15.2% were still suffering from PTSD at the time of the study was conducted (Dohrenwend et al., 2006). The figures reported were seen as high, and a 2006 reanalysis of the NVVRS, using a more conservative approach, found that only 18.7% of veterans had suffered from PTSD in their lifetime with 9.1% still suffering at the time of the study (Dohrenwend et al., 2006). This gives a clear indication that figures given for PTSD prevalence can be very subjective. It also highlights the difficulty in PTSD as a clinical diagnosis and the gaps that still exist in understanding of PTSD.

The recent military conflicts in Iraq and Afghanistan have allowed researchers and clinicians the opportunity to research trauma and PTSD immediately following deployments (Phelps et al., 2016). Research conducted in the years following return from deployment from these conflicts showed between 4% and 17% prevalence rates of PTSD in US and UK military personnel (Phelps et al., 2016). For those in the UK military the rates are at the lower end, however the

association between combat and PTSD is still clear in the UK military population (Iversen et al., 2008).

The difference in PTSD rates between UK and American armed forces personnel have been explained by various factors. These include differences in combat exposure, demographics, tour length, and troop structure (Hunt, Wessely, Jones, Rona & Greenberg, 2014). Figures reported in 2014 showed that more than 500,000 American veterans received PTSD treatment with a total cost of \$3,000,000,000 (Haagen, Smid, Knipscheer & Kleber, 2015). There are no figures given by Haagen et al., (2015) for the cost of treatment for UK military personnel and figures could not be found from other academic or internet sources.

1.3.6.2. Risks, Issues and preventative factors for military personnel.

Studies conducted on both UK and American military populations have found that those joining the military tend to have higher rates of childhood sexual abuse, physical abuse, neglect, and family dysfunction than is typical in the general population (Phelps et al., 2016). As highlighted earlier in the chapter, these are risk factors for the subsequent development of PTSD. This could potentially explain the higher rates of PTSD in military populations. Risk factors specific to military personnel include lower rank at the time of a traumatic experience, absence of a homecoming brief and perceived disinterest by higher ranking individuals (Iversen et al., 2008).

Specific PTSD research into the military population has found that there are additional factors that can reduce the risk of PTSD developing. Key factors reported in the research include effective leadership, unit cohesion and team morale (Phelps et al., 2016). These factors all fall within the theme of as being a part of a group or team. This finding is concurrent with the military's structure, culture of being tightly knit and operating as cohesive teams.

When researched specifically within a military setting, the risk factor of race was a prominent factor for developing PTSD. When differences in combat exposure were statistically controlled for, it was found that the differences in PTSD development rates between different race groups existed but was significantly lower than previously thought (Briere et al., 2014). Specific to military veterans, trauma characteristics of combat exposure (Hoge et al., 2004) and the killing of others (Maguen & Burkman, 2013) were found to significantly increase the likelihood of PTSD developing. Combat exposure has consistently been found to be positively associated with PTSD across a variety of studies (King et al., 2006; Koenen et al., 2003). PTSD severity was also significantly influenced by combat exposure levels with increased combat exposure being positively correlated to increased likelihood of PTSD development (Schnurr, Lunney & Senguta, 2004).

1.3.6.3. PTSD comorbidity in military personnel.

As mentioned previously in the chapter, comorbidity is common with PTSD. A study found that 63% of veterans were experiencing comorbid depressive disorder, generalized anxiety disorder, panic attacks or substance use disorders (McGuire et al., 2014). The comorbid occurrence of PTSD and depression is highly prevalent in the military population (Stander et al., 2014). The prevalence of PTSD with comorbid panic disorder was reported to be consistent with non-military populations (Teng et al., 2013). Statistics for the military populations ranges between 16.5% (Teng et al., 2013) and 36% (Orsillo et al., 1996).

In 2014, a high rates of alcohol dependency were reported amongst post-deployment UK combat forces (Hunt et al., 2014), particularly in males with PTSD (Head et al., 2016). There is evidence that certain PTSD symptoms are more strongly associated with alcohol dependency than others (Head et al., 2016). Head et al., (2016) found that comorbid PTSD and alcohol misuse in the UK military has

a prevalence of 1.8%, in those who report probable PTSD the comorbid PTSD and alcohol misuse in the UK military the prevalence rate was 44.9%, with a further 13.6% who met the criteria for PTSD but were not diagnosed. It was also estimated that a high percentage of combat veterans experienced substance abuse problems when experiencing PTSD (Possemato et al., 2014; Roberts et al., 2015). It is postulated that alcohol and substance abuse is an attempt by individuals to self-medicate their PTSD symptoms (Head et al., 2016; Possemato et al., 2014).

Within the UK Armed Forces increased violence is shown to be highly comorbid with PTSD (Hunt et al., 2014). Research has found that in veterans with PTSD, 41% to 44% experienced difficulty falling asleep, 81% of veterans' experience trauma-related insomnia, and 78% experienced nightmares (Brown et al., 2017). The difficulties experienced in falling asleep and having restful, good quality sleep found in military veterans contributed significantly to the reduction in wellbeing once discharged from the military. There are numerous reasons given for difficulties in sleep, ranging from increased anger to increased hypervigilance (Hunt et al., 2014).

Research into military veterans' wellbeing upon discharge from the military shows that most veterans do well. However, those that have mental health problems tend to retain an overall poorer mental health state than those returning from similar roles (Iversen et al., 2005). There are many cases where military lifestyles (for example structure or comradery) conceal or moderate PTSD symptoms (Phelps et al., 2016). As a result, an individual suffering from PTSD may only become obvious or identifiable once they have been discharged from the military (Phelps et al., 2016). Contributing factors to developing PTSD upon discharge from active duty include: combat exposure; difficult working conditions; witnessing and experiencing life-threatening events; deployment

lengths, and the unpredictability of military service (Reeves, 2007). Veterans who were interviewed confirmed that they attribute several stressful experiences that arose during their military service contributed to their subsequent development of PTSD (Reeves, 2007).

1.4. Assessing and Measuring PTSD

With the seriousness of PTSD and the high level of personal and interpersonal impacts, it is important that PTSD is not just understood but accurately measured and assessed. Since appearing in the DSM, many different methods of assessing and measuring PTSD symptoms to aid in diagnosis have been created and validated. These methods of PTSD assessment can take place either through adult self-report measures, adult interviews or child measures (Department for Veteran Affairs [DVA], 2017).

The most commonly used PTSD assessment methods in academic literature are self-report measures or the Clinically Administered PTSD Scale (CAPS). Many of these have been validated against civilian populations across different ages, with the most recent versions varying between being validated against DSM-IV and DSM-5. Below is a selection of the relied upon measures in recent academic literature on PTSD for individuals over the age of 18 years.

Validated against DSM-IV include the Impact of Event Scale - Revised (IES-R; Weiss & Marmar, 1996), and the M-PTSD Civilian (Lauterbach, Vrana, King & King, 1997). The versions that have been re-validated and/or adjusted against DSM-5 include the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Blevins et al., 2015), the Harvard Trauma Questionnaire (Wind, van der Aa, de la Rie, & Knipscheer, 2017), the Life Events Checklist (LEC-5; Weathers, Marx, Friedman & Schnurr, 2014) and DSM-5 PTSD Symptom Levels Scale (PSLS; Gil, Weinberg, Or-Chen, & Harel, 2015).

1.4.1. Adaption for the military.

There are a number of self-report measures that have been validated specifically using military and veteran populations. Given what has been highlighted about the differences between military and civilian populations in relation to PTSD, this validation is important. However, it is worth noting that while research indicates that there should be different self-report measures for military populations, often self-report measures are validated against civilian populations. There are not many validated specifically for a military population. The way in which these measures are validated for a military population is to follow the process of developing and validating a questionnaire (Parsian & Dunnning, 2009) using military personnel as participants.

Specific to DSM-5 The Mississippi Scale for Combat-Related PTSD (M-PTSD) is a self-report measure that originated from measuring PTSD in military personnel, and was later validated against civilian populations (Orsillo, 2001). Self-report measures that have been validated for military populations against DSM-5 include the PCL-5 (Bovin et al., 2016).

1.4.2. Issue with diagnosing PTSD.

An issue to be addressed at this point is the process of diagnosing PTSD. There are many arguments that the diagnosis criteria are non-specific and that the criteria for PTSD diagnosis is not unique to PTSD (Sparr, 2015). Irritability, for example, is a key indicator of PTSD and is also common to 23 other mental health diagnosis classifications (Sparr, 2015). Attention issues, concentration issues and insomnia are also classic symptoms of PTSD and 32 other conditions (Sparr, 2015). This is further complicated by the fact that PTSD is often comorbid, and therefore the symptoms that are present may also need to be properly attributed to between more than one condition. There are questions posed by researchers

and clinicians as to whether one symptom could be an indicator of two conditions, or if it is only a symptom of one condition.

1.5. Treating PTSD

There are two overall approaches that form the basis for PTSD treatment: pharmacological and psychological. No matter the approach, empirically supported treatments and evidence-based practice are critical elements of treatment standards (Frueh et al., 2012). Evidence based practice (EBP) is the approach used to identify and appraise the highest quality data produced from scientific research to help guide the choice of treatment and assessment practices (Frueh et al., 2012). EBP involves making decisions such as what the best process are to integrate scientific evidence with everyday clinical practice (Frueh et al., 2012). EBP is recommended in Clinical Guideline 26 (cg26; NICE, 2005), produced by NICE in 2005 and updated in 2015 (NICE, 2015). Evidence based practice can be broken down into two separate areas which are dissemination and implementation (Frueh et al., 2012).

Dissemination is the focused distribution in, a controlled manner, of scientific materials and evidence related to an intervention, clinical population, or practice to a relevant group of people (Frueh et al., 2012). Implementation is the strategies employed to ensure the successful adoption of an intervention into everyday practice within clinical settings (Frueh et al., 2012). Published clinical practice guidelines recommend psychological interventions to treat PTSD (Haagen et al., 2015). This PhD will focus only on psychological treatments, often known as interventions.

Guidelines for best practice related to the treatment of PTSD from a psychological standpoint emphasizes the need to actively engage with the traumatic event (Kaminer & Eagle, 2017). There are many components that have been found to

contribute to effective interventions regardless of the type of approach taken (Briere & Scott, 2014).

There are numerous different methods used for the treatment of PTSD. These including trauma-focused cognitive behavioural therapy, exposure therapies, mindfulness therapies, and information processing therapies (Bisson, Roberts, Andrew, Cooper, & Lewis., 2013). Psychological therapies can take place in different modes which are individual therapy, group therapy or multimodal therapy (Haagen et al., 2015). Individual therapies are those that are done individually without a therapist or on a one-to-one basis with a therapist (Haagen et al., 2015). Group therapies include three or more attendees to the session (Haagen et al., 2015). Multimodal sessions are when the overall intervention uses both individual and group therapies (Haagen et al., 2015).

Group therapies aim to increase understanding and encourages support from families of those suffering from PTSD (Riggs, Monson, Glynn, & Canterino, 2012). Even though there are different techniques and therapy types, all sessions tend to follow the same five overall phases of:

- 1) commitment to therapeutic objects
- 2) framing the problem
- 3) reframing the problem
- 4) developing a healing theory
- 5) closure and preparedness (Riggs et al., 2012).

Multimodal interventions are those that can be administered in individual or group formats and can also be conducted as a mixture of any of the different modes during one set of treatments.

Therapies can be broken down into different approaches of information processing therapies; Cognitive, behavioural, and emotional processing therapies; exposure therapies technology-enabled therapies. Of the different methods of therapies available the most highly recommended by clinical guidelines are eye-movement desensitization and reprocessing (EMDR), exposure therapy (ET), cognitive restructuring therapy (CR), cognitive therapy (CT), cognitive processing therapy (CPT), and trauma-focused cognitive behavioural therapy (TF-CBT; Haagen et al., 2015). These will be explained in more detail in the rest of this chapter.

1.5.1. Information processing therapies.

Information processing therapies use techniques to help individuals process memories so that the meaning of the event becomes more clear (Haagen et al., 2015).

An individual treatment falling under information processing therapies is Eye Movement Desensitization and Reprocessing (EMDR; Sikes & Sikes, 2003) and is recommended by NICE (NICE, 2005). EMDR was developed by Francine Shapiro and is an adaptive information processing model (Shapiro, 2001). The adaptive information processing model is that dysfunctional information is stored in memories in a state-specific form which are ruled by cognitive and emotional information of a traumatic event (Shapiro, 2001). This information and linked memories tend not to be adaptive, which in turn causes traumatic symptoms (Shapiro, 2001). EMDR aims to reduce traumatic symptoms by reprocessing the memories and making positive associations (Sikes & Sikes, 2003). EMDR utilizes bilateral stimulation, whereby the participant engages in back-and-forth eye movements (which are tracked) while recounting of a traumatic image, thought processes, emotions and a bodily sensation (Kaminer & Eagle, 2017). This process consists of eight stages, which are:

- 1) Patient history and treatment planning, which is the assessment of the patient
- 2) Preparation, which prepares the patient for the upcoming sessions and starts to form the trusting bond between patient and therapist
- 3) Assessment, which is the assessment of the trauma memory in detail
- 4) Desensitization and reprocessing, which aims to change to traumatic memory
- 5) Installation of positive cognition, which aims to replace particularly traumatic memories with a positive feeling
- 6) Body scan, which the patient identifies any parts of their body that is particularly tense
- 7) Closure, which teaches the patient coping techniques
- 8) Re-evaluation, which reassesses the patient to see if treatment goals have been met and maintained (Cahill, Rothbaum, Resick & Follette, 2012).

It is only stages four to six in the above process that are unique to EMDR (Cahill et al., 2012).

1.5.2. Cognitive, behavioural, and emotional processing therapies.

Cognitive, behavioural and emotional processing therapies are those that focus on the impact of a traumatic event on an individual's system of beliefs, and how this impacts their emotions, cognitive and behavioural responses TF-CBT (Dondanville et al., 2016). Specifically, this looks at the relationship between PTSD symptoms and any dysfunctional thoughts that an individual has relating to the traumatic event (Dondanville et al., 2016). Cognitive behavioural therapy (CBT) that has a specific trauma focus (TF-CBT) demonstrates the strongest evidence for effective treatment for PTSD across populations (Kaminer & Eagle, 2017). There are many different forms and lengths of CBT available. Generally,

there are between 8–12 sessions which involve a number of common elements (Kaminer & Eagle, 2017). These elements are psychoeducation, a level of exposure to traumatic memories, and cognitive reprocessing of the memories (Kaminer & Eagle, 2017).

CPT looks specifically at correcting the negative thoughts associated with the meaning of a traumatic event (Dondanville et al., 2015). It is a 12 session manual-based treatment (Dondanville et al., 2015) which focuses on restructuring maladaptive thoughts that maintain trauma symptoms to allow for emotional processing of the event that caused PTSD symptoms (Kaysen et al., 2014). CPT is widely used as a treatment for PTSD and has been found to be highly effective in reducing PTSD symptoms for a wide variety of different trauma experiences (Kaysen et al., 2014).

CPT has been found to be highly effective in reducing PTSD symptoms in both individual and group formats (Walter, Dickstein, Barnes & Chard, 2014). CPT involves training to aid individuals challenge cognitions that cause problems and distress (i.e. self-blame) and aims to reverse the negative effects of the traumatic event (Cahill et al., 2012). Once the method for challenging cognitions has been taught, the individual is then asked to apply this to their thoughts regarding the traumatic experience itself (Cahill et al., 2012). The individual is also asked to write down a detailed account of the traumatic event and then to read and re-read this in both a private and therapeutic setting (Cahill et al., 2012). During readings, there may be sections that are more difficult to read or articulate (Cahill et al., 2012). It is the sections that individuals find difficult to read or articulate that are given more focused attention during the sessions (Cahill et al., 2012).

A couple's based therapy, called Cognitive-Behavioural Conjoint Therapy (CBCT) aims to enhance relationship functioning while reducing PTSD symptomology

(Monson et al., 2011; Monson & Fredman, 2012). This intervention consists of 15 in person sessions which is divided into three phases (Monson et al., 2011; Monson & Fredman, 2012). Phase one occurs over the first two sessions and focuses on psychoeducation. These sessions involve exercises to help to enforce the educational content (Schumm, Fredman, Monson & Chard, 2013). Phase two occurs over sessions three to seven and focuses on increasing positive communication and empathy skills (Schumm et al., 2013). Phase 3 occurs over sessions 8 through to 15 and focuses on couple led cognitive change (Schumm et al., 2013). Once all the sessions have been completed discussions about maintaining progress and lapse prevention occurs, this involves plan formulation and scenario planning and preparation (Schumm et al., 2013).

1.5.3. Exposure therapies.

Exposure based therapies (ET) use imaginal recollection and reliving of the traumatic experience to confront the traumatic memory (Wisco, Sloan & Marx, 2013). This requires the individual being treated to report their worst traumas (Maguen & Burkman, 2013). ET has been found to be highly effective (King et al., 2013). The theory behind ET is that repeated exposure to the traumatic memory (in what is considered a safe environment), combined with disconfirming negative cognitions will reduce and remove any fear and anxiety related to the traumatic event and therefore reduce PTSD symptomology (Schnyder et al., 2015).

Prolonged Exposure (PE) is a type of exposure therapy that has two primary parts. The first part involves a number of stages. The participant engages in repeated, step-by-step retelling of their most distressing traumatic experience (Kaminer & Eagle, 2017). The retellings are followed by the identification of the participants' beliefs and feelings that are activated by the traumatic experience (Kaminer & Eagle, 2017). Maladaptive beliefs are then challenged through specifically defined

cognitive techniques (Kaminer & Eagle, 2017). The second part of PE is the gradual exposure to situations in the participants' life that have become associated with the traumatic event (Kaminer & Eagle, 2017). However due to the confrontational and aggressive nature of this type of intervention, there is a high dropout rate.

Narrative exposure therapy (NET) is another method that facilitates individuals in creating a coherent narrative of their memories (Jacob et al., 2010). NET recognizes the possibility that survivors of trauma may present with specific needs due to multiple exposures to trauma and a scarcity of trained mental health professionals (Schauer, Neuner & Elbert, 2005). This therapy lasts approximately four sessions which take place in the client's home or their own choice of safe environment. Throughout the therapy period, the client chooses to undergo emotional exposure and recalls painful memories to help habituate them to their emotions and memories relating to the trauma. NET begins with the participant using a string or a ribbon to construct a lifeline that represents their life up to a specific point in the future (Kaminer & Eagle, 2017). The lifeline is then populated with symbols to represent traumatic experiences and positive events (Kaminer & Eagle, 2017). After this, all traumatic events that have been highlighted on the lifeline are narrated in detail. A full written testimony of the traumatic experiences is developed by the end of therapy (Kaminer & Eagle, 2017).

1.5.4. Technology-enabled therapies.

Technology-enabled interventions for PTSD are those that utilize technology to deliver or aid in treatment for PTSD. Currently, most of these rely on the use of the internet. There are a number of treatment options that have been researched across different types of mental health issues. However, there have been very few researched for the treatment for PTSD.

The main research into technology-enabled intervention is Computerized Cognitive Behavioural Therapy (CCBT). This research has adapted CBT strategies to address PTSD virtually and has been found to be an effective method for the treatment of PTSD among military personnel and civilian populations (Possemato et al., 2014). CCBT includes psychoeducation, relaxation training, cognitive restructuring, and written exposure modules in the intervention (Amstader, Broman-Fulks, Zinzow, Ruggiero & Cercione, 2009). CCBT does not effectively account for the complexity of PTSD and the individual impeding on the overall effectiveness of the intervention.

1.5.5. Barriers to receiving treatment and treatment success.

This chapter has so far illustrated different types of psychological interventions that are available to treat PTSD. However, there are numerous barriers to the effectiveness of or the ability to receive treatment in the first place. These are important to consider when developing and administering PTSD treatment. Barriers can be internal to and/or external to the individual.

Internal factors are factors that are specific to an individual with no influences coming from any other source. An internal factor of receiving and responding to the intervention is coping. Coping has been found to be directly related to the effectiveness and reach of preventative measures and psychological interventions (Tiet et al., 2006). Coping is defined as an effort by an individual to prevent, diminish or reduce distress or feeling of harm, threat or loss caused by a perceived threat or loss (Carver & Connor-Smith, 2010). There are many different strategies adopted by individuals to manage internal or external stressors in a conscious effort to lessen the effects of these stressors. These strategies are known as coping strategies (Krause, Kaltmanm, Goodman & Dutton, 2010). There are many different classifications of coping strategies (Tiet et al., 2006). However,

orientation coping is most commonly research in PTSD research (Wong, Looney, Michaels, Palesh & Koopman, 2006).

Orientation coping consists of two types of coping categories of 'approach coping' (a concentrated effort to deal with stressful situations and emotions; Polman, Borkoles & Nicholls, 2010) and 'avoidant coping' (effort to avoid confrontation with stressful situations and emotions; Polman et al., 2010) styles. Coping strategies are important as all interventions can only be effective if an individual chooses to take an approach coping strategy and actively engages with the intervention. In addition to this, there are many other treatment seeking barriers such as stigma, practical barriers, or cost-benefit doubts (Stecker, Shiner, Watts, Jones & Conner, 2013) that may need to be overcome.

Related to coping, another barrier to treatment success is known as the pain paradox. The pain paradox is when an individual engages in behaviour that increases or sustains pain in an effort to reduce pain (Briere & Scott, 2014). It is evidenced that breaching the pain paradox barrier is an important stepping stone to recovery (Briere & Scott, 2014). Breaching this barrier involves recalling the traumatic event as a starting point to recovery (Briere & Scott, 2014). If an individual is not willing to recall the event, then it is difficult to begin to reduce PTSD symptoms (Briere & Scott, 2014).

External factors are factors outside of an individual that the individual cannot control (Tiet et al., 2006). External barriers of culture are prominently featured in the academic literature. Cultural competence, cultural sensitivity and treatment differences which are employed by therapists during interventions for people from different ethnic groups (Meyer, Writter & Brim, 2016) can affect the effectiveness of PTSD treatment (Phelps et al., 2016). Studies on race differences in health care utilization following trauma have found that Caucasians are more

likely to seek treatment for depression, anxiety and PTSD than those from any other race (Frueh et al., 2012). Triffleman and Pole (2010) found that culturally based stigma towards those who need or may need mental health treatment, along with discrepancies in race and culture between clients and therapists, as well as the financial costs associated with treatment may lead to reluctance in seeking professional treatment.

There is a general stigma attached to PTSD both in diagnosis and seeking treatment (Fear et al., 2014). As a result, some individuals either do not seek treatment or delay seeking treatment. Those who delay seeking treatment for years can inadvertently cause a reduction in treatment effectiveness when they eventually do undertake treatment (Fear et al., 2014). Even where individuals are knowingly or unknowingly experiencing PTSD symptoms, it is very common wait extended periods of time before seeking treatment (Koenen et al., 2017). Research suggests that there is a link between perceived stigma and comorbid alcohol abuse as alcohol is seen as a method of self-medication and treatment (Miller, Pedersen, & Marshall, 2017).

1.5.6. Interventions and barriers for military personnel.

1.5.6.1. Interventions for military personnel.

PTSD that results from military service has been documented as a significant challenge to treatment and treatment facilities across the world (Yehuda et al., 2014). Numerous therapies have been tested on military personnel. These generally have a specific focus on treating combat-related PTSD. Research into therapy effectiveness found that the mode of therapy had an impact on effectiveness, with multimodal therapy is the most effective, followed by individual therapy and group therapy being the least effective (Haagen et al., 2015). There were no differences found in effectiveness of treatment for military

personnel/veterans across demographic variables such as age, gender, military rank or marital status (Haagen et al., 2015).

Research establishing the effectiveness of psychological interventions on military populations specifically showed that for the sample of military veterans CPT was the most effective, followed by ET and EMDR (Haagen et al., 2015). ET and CPT interventions were found to be effective in either individual or combined individual and group formats (Haagen et al., 2015). EMDR was found to be significantly less effective when conducted in a group format (Haagen et al., 2015). Stress management therapy (SMT) is therapy to increase stress reduction skills and focuses specifically on alleviating the symptoms of PTSD (The management of post-traumatic stress Working Group, 2015). SMT was developed originally for anxiety disorders and then modified for rape victims and later for PTSD (The management of post-traumatic stress Working Group, 2015). SMT has been extensively studied in the treatment of PTSD (The management of post-traumatic stress Working Group, 2015). Specifically, within military populations, treatment was found to be less effective if they had become socially isolated, were experiencing marital issues or had poorly functioning families (Haagen et al., 2015). However, SMT was found to be more effective than exposure therapies (Haagen et al., 2015).

Mindfulness-based interventions have a small but growing evidence base (Cloitre, 2009). Mindfulness based therapies use training to sustain mindful attention to and acknowledgment of all emotions (negative or positive) or memories in a non-judgmental manner (King et al., 2013). A Group Mindfulness-Based Cognitive Therapy (MBCT) was piloted and found to be effective for combat PTSD with the publication released in 2013 (King et al., 2013). This intervention was adapted from the MBCT therapy used in prevention of depression and consists of once a week eight-hour group sessions for eight weeks (King et al., 2013).

The mindfulness sessions involved practical and skills training in areas including mindfulness techniques, group discussion and psychoeducation (King et al., 2013). In addition to the in-person sessions, participants are instructed to complete daily home practice assignments and informal everyday exercises (King et al., 2013). The participants were asked to record their progress in a log. Even though the drop-out rate was 25% there was a clinically significant improvement in 73% of participants (King et al., 2013).

MBCT was adapted to fit military related PTSD (King et al., 2013). Subsequently most MBCT interventions have been researched within the military population (King et al., 2013). The adjusted MBCT consisted of eight two-hour weekly group sessions including skills training and in-class practice, specific in-class mindfulness exercises, daily assignments of formal home practice of mindfulness techniques, informal exercises and the use of the MBCT '3-Minute Breathing Space' (King et al., 2013). Participants were asked to practice mindfulness exercises accompanied with audio-recordings at least five days a week, three-minute breathing exercise each day and practicing mindfulness though out a day (King et al., 2013). Participants recorded practice times in logs which were collected each week (King et al., 2013).

Many cognitive based therapies have been found to be effective in military populations. Cognitive behavioural group therapy for military populations was specifically designed with the military in mind by Shea, McDevitt-Murphy, Ready & Schnurr (2012). It runs in three phases of:

- 1) education and group introductions
- 2) identification and re-experiencing of trauma, including individual work and homework
- 3) relapse prevention, planning and managing coping (Shea et al., 2012)

It was found to be effective in military populations (Shea et al., 2012). CBCT has been found to be an effective group therapy for military PTSD (Monson & Fredman, 2012). CBCT has also been found to be highly effective when treating military veterans and is one of the most relied upon interventions for treating PTSD in military personnel (Dondanville et al., 2015).

Technology-enabled interventions have also been validated with the military and veteran population. A literature search conducted by the researcher resulted in a higher number of innovative academic publications and ongoing research into technology-enabled interventions for military personnel for PTSD. An example is Virtual Reality Exposure Therapy (VRET), which has been found to be effective in military populations (Nelson, 2013). The sessions can span over a number of weeks with biweekly 90-120 minute sessions (Nelson, 2013). The therapy seeks to simulate a real-world environment which mirrors reality in which the trauma occurred to cause a “sense of presence” (Nelson, 2013). Once a sense of presence has been established, VRET uses technology to engage the client’s five senses through a delivery of sensory simulation that is controlled via the therapist containing many different sensory cues (Nelson, 2013).

Session one consists of an assessment and information gathering exercise. Session two and three acclimatizes the client to the equipment and environment and aims to teach mitigating techniques during times of high symptom presentation (Nelson, 2013). All further sessions are spent working in the virtual environment (Nelson, 2013). Clients are assigned homework that involves practice and review (Nelson, 2013). The study that Nelson (2013) conducted validated VRET only for military and veteran personnel but the researcher still encountered difficulties in gaining acceptance of the treatment in the older military population (Nelson, 2013).

Another technology-enabled intervention specifically targeted at military veterans is The PTSD Coach Application, developed by the Veterans Association (Kuhn et al., 2014). There are four distinct sections to the app which are 'Learn', 'Self-assessment', 'Manage Symptoms', and 'Find Support' (Kuhn et al., 2014). 'Learn' provides psychoeducation for PTSD and lists various psychological intervention options that are available (Kuhn et al., 2014). 'Self-Assessment' includes the PTSD Checklist–Civilian version (PCL-c; Kuhn et al., 2014). After completing the self-assessment, participants are given interpretive feedback about the severity of their symptoms and details of changes in symptom severity where relevant (Kuhn et al., 2014). 'Manage Symptoms' provides coping tools to help PTSD symptoms (Kuhn et al., 2014). 'Find Support' allows users to reach out to others where required (Kuhn et al., 2014). There are no formal or specific processes on how, or when to use the app. It was advised to be used as, and when, the user felt it most helpful or appropriate.

1.5.6.2. Barriers to treatment for military personnel.

It has been stated within the research literature that UK service personnel experiencing mental health difficulties struggle to seek help (Murphy & Busuttil, 2014). It was found that help-seeking rates in UK military personnel are broadly similar to those found in the general population (Forces in Mind Trust, 2015). There are a substantial number of veterans who do not even start, let alone complete, treatment for PTSD. There are even military personnel and veterans who even refuse support when it is offered (Cigrang et al., 2015). A 2006 survey found that only 23% of UK service personnel were getting support from mental health services and of these 51% were receiving psychological therapy (Iversen et al., 2010). Statistics from the United Kingdom reported by Combat Stress indicate that it takes an average of 11.8 years from leaving their military service to the point of being referred to Combat Stress (Murphy et al., 2015). PTSD treatment

research in American veterans, in contrast, found that at least 78% of individuals continue to receive treatment for over 4 years (Haagen et al., 2015). There are a number of reasons postulated for the difference between treatment seeking between American and UK military veterans. Recent research conducted on UK military veterans found that the longer it takes to seek support for PTSD is associated with PTSD symptoms that were more severe (Murphy, Ashwick, Palmer & Busuttil, 2017).

A very prominent barrier to seeking treatment for PTSD in military populations is the stigma attached with seeking treatment (Miller et al., 2017). Stigma can come from both internal military sources and civilian sources (Murphy & Busuttil, 2014). Military research in the UK has suggested that it is seen as more legitimate to suffer from a physical illness rather than from a mental health illness (Murphy & Busuttil, 2014). This suggestion is further supported by research that found that UK military personnel are much more likely to attend a first appointment if it is for a medical rather than a psychological illness (Murphy & Busuttil, 2014). There is a belief that seeking treatment for a psychological issue will give the impression of weakness and therefore causes military personnel to downplay their symptoms (Miller et al., 2017). However, Forces in Mind Trust reported that stigma was not the main reason for not seeking treatment for PTSD in a study they conducted with 62 military participants (Forces in Mind Trust, 2017).

There is evidence showing that military leaders viewed service personnel who are accessing mental health services more negatively than their peers (Murphy & Busuttil, 2014) which impacts on the desire to seek treatment. In relation to this, individuals fear that seeking treatment will have a negative impact on their career progression (Coleman, Stevelink, Hatch, Denny & Greenberg, 2017). In younger military personnel, there is also the perception that individuals who are choosing to leave the unit (and therefore prioritizing themselves over unit productivity and

readiness) are not 'for the group' (Miller et al., 2017). This highly individualistic approach currently does not fit with military culture (Miller et al., 2017). Even though perceptions are changing, until there is a significant change in the overall culture and group perceptions this is still a prominent barrier to accessing mental health services. These barriers for younger military professionals is concerning given the positive correlation that exists between age and lifetime PTSD prevalence. Even those that do seek treatment encounter a number of barriers to treatment effectiveness.

For military personnel, there are very specific cultural barriers to treatment effectiveness. The concept that military service (or simply being in the military) is a separate culture is a concept that is only recently being acknowledged and gaining research attention (Meyer et al., 2016). Understanding and integrating military culture into research includes aspects such as understanding military language (Phelps et al., 2016) or the rank/grade system (Hall, 2011). The code of manners, rituals, beliefs and norms of behaviour are key to successful interventions (Meyers et al., 2016). Understanding these cultures helps to build trust with the participant and increases treatment fluidity. Hall (2011) stated "Unless we understand their language, their structure, why they join, their commitment to the mission, and the role of honour and sacrifice in military service, we will not be able to adequately intervene and offer care to these families." (p. 4).

A significant barrier to receiving treatment for UK veterans in comparison to other nations is that there is no formal system for healthcare for veterans in the United Kingdom (Yehuda et al., 2014). As a result, it is more difficult to access information and treatment specifically tailored to military personnel or veterans. Research conducted through randomised controlled trials (RCT) have shown that

many interventions for PTSD are more effective in civilian populations (Yehuda et al., 2014).

There is speculation that the time commitment for some therapies is too long, which is a barrier to those who cannot commit the time to fully engage with treatment. Sessions can last up to 15 weeks, are usually in person and conducted in specialty mental health clinics with specially trained clinicians (Cigrang et al., 2015). Additionally, most therapies for PTSD asked participants to engage with the trauma memory and resulting emotional impact, which can be difficult for military veterans given their training on self-discipline and self-control (Yehuda et al., 2014).

Forces in Mind Trust suggested further research into investigating if PTSD is seen as a badge of honour that can lead to abnormal behaviours and impact negatively on family, and how ex-Service personnel be empowered to seek help if this is the case (Forces in Mind Trust, 2015).

1.5.7. The future of interventions.

In an ever-changing society, there has been an acceleration of technological developments that has never been witnessed before (Schabracq, Cooper & Winnubst, 2003). Statistics show that in 2012, 67% of individuals used a computer every day (ONS, 2012) and 83% had access to the internet in 2013 (ONS, 2013). In addition to this, statistics show that access to the internet via mobile devices increased from 24% to 53% between 2010 and 2013 (ONS, 2013). There are a number of advantages stated in the literature for having access to technology-enabled interventions.

Technology-enabled interventions are often personalised to a specific demographic or purposefully diverse to cater for a wide range of users and can

reach a large audience (Amstadter et al., 2009). This mode of intervention can also be accessed in private so the stigma issues are no longer present. Internet interventions can be easily updated with little to no additional or re-training required (Amstadter et al., 2009). While there are a few technology-enabled interventions that have been fully validated and trialled, these are of a much smaller percentage than the more traditional interventions. However, so far, the technology-enabled interventions that have been researched have been found to be just as effective as in-person interventions based on the reduction on PTSD or trauma scores in the civilian population (Amstadter et al., 2009). In the UK veteran population, in the majority of cases, tele-therapy was found to be as effective in reducing PTSD symptoms as in-person interventions (Turgoose, Ashwick, & Murphy, 2017).

Research has shown that military personnel are often interested in technology-enabled treatment, especially those who live in more remote locations (Possemato et al., 2014). Indeed, this is becoming more integral as people with PTSD gravitate towards remote locations to reduce the negative effects of hyperarousal and interpersonal conflict (Moreland, Frueh, Pierce & Miyahira, 2003). Technology-enabled interventions can also be used to overcome barriers to military personnel and veterans from seeking treatment as it would allow treatment to be completed in private and at their convenience (Possemato et al., 2014).

1.6. Conclusions From the Literature

As can be seen from the literature, PTSD has undergone steady development based on research, knowledge, understanding and practice. With a recently released DSM (DSM-5), the research that exists in relation to PTSD, assessing and diagnosis of PTSD, and treating PTSD is in the process of being updated and validated. The PTSD diagnosis is constantly changing and adapting to new

research and understanding. Indeed, with the new format in DSM-5, it is expected that updated versions with minor changes will be continually released so that it is kept as up-to-date as possible. There is a plethora of research into the development of interventions and establishing the effectiveness of these among different populations. Continuing this research to ensure that the research is relevant and fitting to modern society and understanding of PTSD is essential.

There are many effective group and individual interventions for PTSD which have been proven to be effective across different populations. However, access to interventions is still restricted by the barrier of ease of access. There is limited research on technology-enabled interventions, many of which have been found to be effective for treating PTSD. There is still a heavy reliance on therapist involvement and, to date, research has not focused on using technology as a part of intervention options. With the advances in technology and changes to society, it is becoming more important to create and validate more technology-enabled interventions. This would allow for increased access to interventions for PTSD and can overcome the barriers to accessing effective interventions.

Whilst there is limited research on technology-enabled versions of interventions, such as CCBT, research indicates that the process is difficult. However, with modern life and increasingly more advanced technology becoming available it becomes more imperative that interventions for treating psychiatric conditions and psychological issues are researched to bridge this gap.

1.7. Aims and Objectives of the PhD

This PhD aims (high level) to create and test a technology-enabled intervention to help treat UK military veterans suffering from PTSD. The objectives (specific) are:

1. To qualify veteran perceptions of current psychological interventions that they have experienced, and where and how a technology-enabled intervention could aid or replace existing options.
2. To establish how effective in reducing PTSD the technology-enabled intervention is and establishing perceptions of the intervention.

In doing the above, this research will provide a comprehensive view on the effectiveness of the technology-enabled intervention, as well as perceptions of the intervention from different stakeholders. The overall aim is to begin to bridge the gap between traditional interventions and technology for PTSD.

1.8. Research Questions

Considering the outcomes of the literature review in this area and the aims of the PhD, the overall research question is:

How effective is a technology-enabled intervention set at reducing PTSD symptoms in British military veterans?

The following specific research questions will be addressed in this thesis:

- A) What psychological interventions on an individual basis have been found to be effective in the existing literature? Of these, which were tested on military personnel and how effective are they on military populations? Of these, which were interventions driven by technology and how effective were these?
- B) What do traumatized veterans feel is effective and ineffective in current treatment/ interventions? What should be provided?
- C) How should technology-enabled PTSD interventions be used to aid in PTSD treatment, and what are the components of the intervention?
- D) Can the technology-enabled intervention help those who suffer from PTSD to experience fewer symptoms?

E) If the technology-enabled intervention does reduce symptoms, in what ways does the experience of using the intervention help and why?

Chapter 2: Methodology

2.1. Introduction

This chapter provides an overview of the methods that have been employed for studies conducted throughout the course of the PhD. It covers methodological justifications, participant demographic information, analytical approaches, psychometrics, and statistical tests. Any methodological and ethical issues are also discussed. All study specific details are covered within the relevant chapters.

To answer the overall research questions posed in Chapter 1 section 1.8 (analysing if a technology-enabled intervention for the treatment of PTSD is effective for military veterans and if so why), 4 studies were undertaken. A summary of these can be seen in Table 2.

Table 2

Table Summarising Studies Throughout the PhD

<u>Study number</u>	<u>Title</u>
1	A systematic review of individual PTSD treatments
2	Interviews of veterans' experience of PTSD treatment
3	A trial of PTSD technology-enabled intervention
4	Perceptions of the technology-enabled PTSD intervention by veterans

The purpose of Study one was to analyse the literature, in a very controlled and scientific manner, what treatments for PTSD are delivered on an individual basis and if these have been effective. The analysis aimed to give the researcher an in-depth understanding of treatments that exist and if the scientific research has found these to be effective across different populations and/or situations. This study was used to inform subsequent studies and gave the researcher relevant knowledge, and therefore some credibility, when conducting interviews in subsequent studies. This is particularly important as the target population are at

high risk of distress, and any lack of understanding or awareness on the part of the researcher may bias research outcomes (this will be discussed further in this chapter).

The purpose of Study two was to establish the thoughts and feelings of veterans who have previously experienced PTSD treatment in any form and who self-reported that they were no longer suffering from PTSD at the time of the study. The interviews sought to establish which treatments they have experienced, why they were perceived to be effective or not, what emotions they associated with the experience, what their experience was, whether they would be open to trying a technology-enabled intervention, and what they would like to see in a technology-enabled intervention. These questions were key as the responses received would inform design and treatment choices going into developing the intervention.

The purpose of Study three was to establish the effectiveness of the PTSD technology-enabled intervention over time. Study four then followed up with willing participants who had undergone or logged into the technology-enabled intervention to establish their opinions of the technology-enabled intervention. This is key to inform future design and to establish the likelihood of the technology-enabled intervention being used as a first port of call for those who are unsure, unwilling or unable to seek in-person treatments.

These four studies are inter-related and could only happen in sequence as the results from the preceding study fed directly into the subsequent study. The inputs from the previous study required for the subsequent study is represented in figure 2.

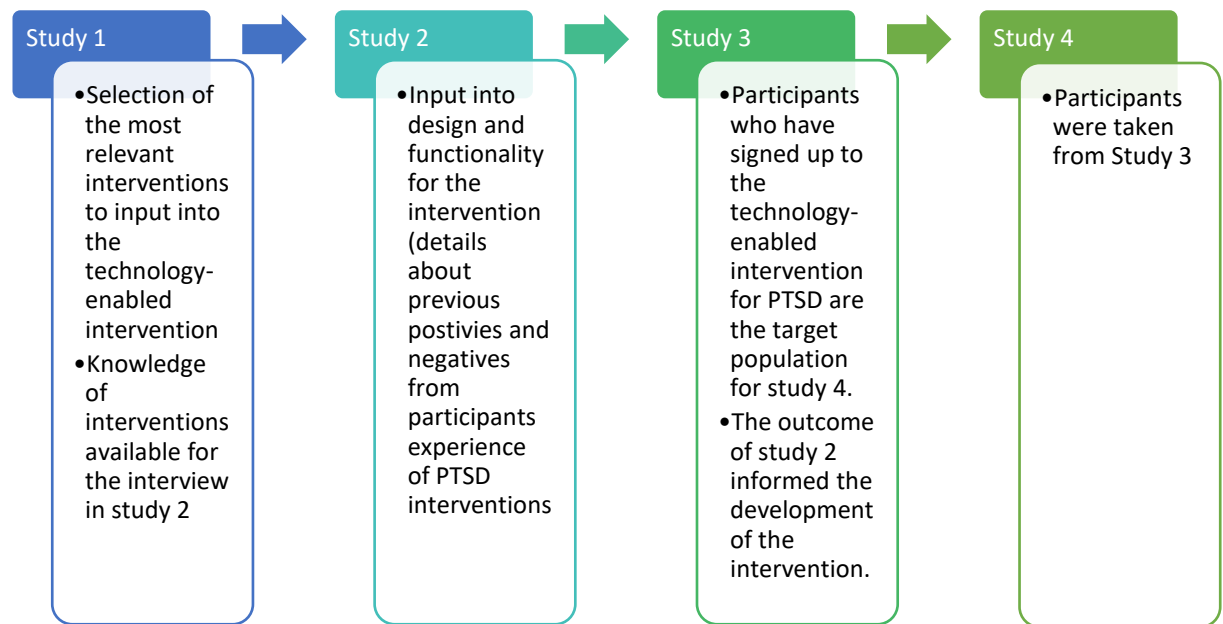


Figure 2. Schematic Overview of Inter-relation of the Studies Conducted

2.2. Research Framework

The underpinning research framework used as a guideline in this thesis is the Medical Research Council's (MRC) guidance for developing complex interventions (Craig, Dieppe, Macintyre, Michie, Nazareth & Petticrew, 2008). The reasons that this is appropriate is that the framework is developed specifically for complex interventions, which is defined as interventions containing several interacting components (Craig et al., 2008). These guidelines were originally created in 2000 by the MRC in order to help researchers adopt and recognise methods that address the issues with evaluating interventions, the methodological/practical issues of assessing an intervention (Craig et al., 2008).

This PhD was to develop a number of interacting and interchangeable components in one overall intervention. The MRC guidance suggests a framework of development-evaluation-implementation process (Craig et al., 2008). This process consists of:

- Developing an intervention
- Piloting and feasibility
- Evaluating the intervention
- Reporting
- Implementation

Within each of these process steps, there are a few key elements (Craig et al., 2008), which can be seen in Figure 3.

Development

- Identify a base of evidence
- Develop a theory
- Model process and outcomes

Feasibility/Piloting

- Test Procedures
- Estimating recruitment
- Establishing Sample Size

Evaluation

- Analysing effectiveness
- Understanding the change process
- Establishing cost-effectiveness

Implementation

- Communicating
- Monitoring
- Follow up over time

Figure 3. Key Elements of the MRC Process

During the development stage of the framework, it is key to identify information and evidence in the area specific research area of interest. This often involves carrying out a systematic review (Craig et al., 2008). It is also important to have a clear theoretical rationale for the intervention underpinning the design of the intervention and evaluation method (Craig et al., 2008). This stage was addressed by Study 1 and 2 (See Table 2) of this PhD with the specific details of the intervention design reported in Chapter 5.

The next stage of the process is to assess feasibility and pilot (Craig et al., 2008). This stage involves testing procedures for their acceptability, estimating rates of recruitment, participant retention and the calculation of sample sizes (MRC, 2006). Generally, a mixed methods approach is recommended for this stage of the process (Craig et al., 2008). However, it is noted that this stage is often skipped (MRC, 2006). This stage was addressed by Study three and four of this PhD (see Table 2).

Evaluating the interventions is the next stage of the process (Craig et al., 2008). Randomisation is recommended for this stage as it is the best method for preventing selection bias, however an experimental approach that is not randomised is also considered an appropriate approach (Craig et al., 2008). Another key consideration is the choice of outcome measure, to ensure that you collect the most relevant data with the most appropriate self-report measure (Craig et al., 2008). This stage was not addressed by this PhD as an RCT was not conducted.

In addition to evaluating the outcome of the intervention, it is important to conduct a process evaluation to provide insight into why an intervention is successful or unsuccessful and how it can be improved (Craig et al., 2008). The process evaluation should be conducted to the same standards as the assessment of the main intervention. The final stage of implementation is key to getting the evidence of intervention into everyday practice and monitoring long term outcomes (Craig et al., 2008). This stage was also not addressed by this PhD.

2.3. Population

This research focused specifically on military veterans who had served in the UK Armed Forces for the minimum of the MoD definition of a veteran (in all studies,

participants served in the military for at least four years, which is greater than the MoD definition of serving for one day). Whilst there are many population types that experience trauma and causes of trauma, as mentioned in the introductory chapter, there are a number of reasons for selecting this population.

Predominantly, as stated chapter one, the origins of PTSD as a psychiatric diagnosis were that of the military (Phelps et al., 2016), making the military population ideal for PTSD research. The population, though difficult to access, is very clear and therefore causes little question around recruiting participants from the military experiencing trauma that is a result of military experience.

Secondary to these reasons, the researcher has been involved with the UK Armed Forces in some capacity from the age of 14 years. The research therefore has some knowledge in the experiences of those in the military, the expectations of the target population, the behaviours and cultures. The researcher, within her experience with the UK Armed Forces (both The Royal Air Forces and The Royal Navy) also encountered serving members of the UK Armed Forces who were experiencing unreported PTSD. This gave the researcher personal reasons for focusing on participants from a military background. With the above experience and knowledge, access to and the understanding of participants from this specific population is made easier. There were implications and additional controls put into place as a result of this involvement, which is discussed in chapter 2, section 2.3.3.

2.3.1. Sampling methods.

All participants were a part of the British Armed Forces and subsequently became a Veteran (by the MoD definition) before participating in any research studies in this PhD. A mixture of volunteer sampling, opportunity sampling, and internet sampling methods (Field, 2013) were used for all studies within the PhD. Details about the sampling method will be provided in the relevant chapters.

2.3.2. Selection criteria.

The inclusion and exclusion criteria that applied across all studies can be seen in Table 3. The rationale for the inclusion criteria of the age of over 18 years was that under UK law, those under the age of 18 years are not recognized as adults and therefore cannot give consent without a proxy (ForcesWatch, 2011).

Additionally, even though the age of recruitment to the UK Armed Forces is 16 years of age, there are many debates and public calls to raise this age to 18 years (ForcesWatch, 2011). These calls and debates are also reflected in reports in the media.

The reasons used for the inclusion of military veterans as participants and not active duty personnel stemmed from the researchers understanding of researching with active duty personnel. The protocols in place for those who are still on active duty and the difficulty and/or risk to personal and group wellbeing and safety to including active military population were taken into consideration in the decision making process. This was made more complicated when taking into account the high number of prominent ethical issues that arise from working with serving personnel and the lengthy MoD ethical application process required to access active duty personnel. The timelines for gaining ethical approval from the MoD were not appropriate for the time allocated to conduct this research. While there are still many ethical considerations to working with the veteran population, the risk of affecting any active duty job performance no longer exists.

The justification for including those only serving in the UK Armed Forces was due to the cultural differences in Armed Forces across the world (Greene, Buckman, Dandeker & Greenberg, 2010; Tran, 2016) and due to the different combat experiences and operations between countries (Tran, 2016). Controlling for these variables as much as possible gives a better insight and more reliable and valid results.

Table 3

Table of Inclusion and Exclusion Criteria for Studies 2, 3 and 4

<u>Inclusion</u>	<u>Exclusion</u>
Over the age of 18 years	Under the age of 18 years
Previously served in the UK Armed Forces.	Currently serving in the UK Armed Forces (even if they are on medical leave). Previously served in Armed Forces that is not UK. Currently receiving any form of treatment for PTSD (psychological or pharmacological)

The rationale for the exclusion criteria of individuals currently receiving professional treatment for PTSD was that this research could affect the outcome of their treatment and vice versa. If the individual experiencing PTSD has access to and/or is undertaking treatment, this individual and the therapist delivering the treatment should have full control and knowledge of all treatment that their patient is undergoing. The rationale for the exclusion criteria of 'currently serving in the Armed Forces' was that anyone currently serving in the UK Armed Forces must, by regulation, go through the MoD for their health care requirements (NHS, 2015). This health care can potentially be provided through the NHS (NHS, 2015). The aforementioned cultural differences between armed forces of different countries extends to exclusion criteria of military veterans who did not serve in the UK Armed Forces.

2.4. Methodological Approach

To determine the answer to the research questions posed in Chapter 1, section 1.8 as a collective, a mixed methods approach was taken. A summary of the methodological approach and related methods used for the four studies can be seen in Table 4.

Table 4

Methods Used Across Studies

<u>Study</u>	<u>Methodological approach</u>	<u>Methods</u>
1	Quantitative	Systematic review
2	Qualitative	Semi-Structured Interview
3	Quantitative	Self-report questionnaires
4	Qualitative	Semi-Structured Interview

The reasons for this were derived directly from the research questions themselves. At a fundamental level, the purpose of research question C (stated in Chapter 1, section 1.8) was to ascertain whether there was a reduction in scores on the PTSD questionnaire. A reduction would indicate a lessening in the symptoms that are associated with PTSD and therefore participant improvement. This as a research question lends itself solely to quantitative research. However, quantitative data was not suitable for research questions A and B (stated in Chapter 1, section 1.8). These research questions sought to establish the rich detail of an individual's experience. This was much more suited to qualitative data, as in order to get the depth of detail open-ended interviews are required.

In order to implement and successfully evaluate an intervention set which aims to reduce PTSD symptoms in the target population there were a number of variables that needed to be controlled. This requirement meant that an experimental, independent variables design was most suited to this research. An additional reason (and benefit) for using a mixed methods approach is that it allows for triangulation to be used.

Triangulation is the use of a combination of multiple methods to establish if the results of all relevant studies can be attributed to one specific phenomenon (Turner, Cardinal & Burton, 2017). This enables researchers to look at the research from different angles and allows the collection of richer and more rounded data (Archibald, 2016). This is particularly useful in research conducted into human behaviour and increases credibility and validity of qualitative research (Cohen & Mansion, 2010). There are four types of triangulation: 'data', 'investigator', 'theory', and 'methodological' (Denzin, 1978). Data triangulation is the use of a variety of sources in a study, investigator triangulation is the use of several different researchers, theory triangulation is the use of multiple perspectives and theories to interpret the results of a study and methodological triangulation is the use of multiple methods to study a research problem (Johnson, Onwuegbuzie & Turner, 2007). The method of triangulation used in this research was methodological (using different methods to collect data; Denzin, 1978). This method was the most appropriate for a PhD.

There is also a difference in triangulation based on the type of data that are collected, within-methods triangulation and between-methods triangulation (Johnson et al., 2007). Within-methods triangulation refers to the use of either multiple quantitative or multiple qualitative approaches, in essence using one type of approach across multiple studies (Johnson et al., 2007). Between-methods triangulation involves the use of both quantitative and qualitative

approaches (Johnson et al., 2007). Between-methods triangulation was chosen. The reasons for the use of between-method triangulation was to combat “the bias inherent in any particular data source, investigators, and particularly method will be cancelled out when used in conjunction with other data sources, investigators, and methods” (p. 14); and (b) “the result will be a convergence upon the truth about some social phenomenon” (p. 14).

2.4.1. Quantitative approach.

Measurable, reliable, valid, quantifiable and repeatable measures needed to be adopted in order to allow comparison of before and after scores. In order to do this, quantitative measures were adopted. Only questionnaires that are valid (measuring the phenomenon that it should be measuring; Rust, 2012) and reliable (that a questionnaire will consistently produce the same or similar results irrespective of who is taking it; Rust, 2012) were chosen. An additional benefit is that using widely utilized standardized questionnaires allows the result to be more comparable to the existing body of research.

2.4.2. Qualitative approach.

When conducting and analysing qualitative research, there are a number of issues to be conscious of. The most prominent of which is researcher subjectivity. A common method used to minimise the effect of researcher subjectivity (views and interpretations of data based on their own personal experiences and values) is the use of reflexivity (Pryia & Dalal, 2016). Reflexivity is a process whereby the researchers analyses their role in the studies conduction to fosters self-awareness (Palaganas, Sanchez, Molintas & Caricativo, 2017). There are two types of reflexivity – personal reflexivity and epistemological reflexivity (Wilig, 2013). Personal reflexivity is the awareness of the researchers own contribution to the construction of meaning in the research process (Wilig, 2013). Epistemological reflexivity is the analysis of the ways in which the research

questions could have been addressed differently and how the analysis has constructed the data (Willig, 2013).

Reflexivity was an important practice for this PhD. As the researcher has been involved in military activities since the age of 14 years old (when the researcher joined the combined cadet force as a part of after school activity). This association continued through into tertiary education and further into joining the military reserves. Due to this experience, the researcher has personal knowledge of the everyday emotional impacts of PTSD to the individuals who suffer from the condition. In addition, due to having the experience of being a part of a military unit and understanding (to some extent) unit cohesion and comradery, the researcher had to make extra effort to not lead the participants in a particular direction of response during the interview sessions. The implications of the researchers' association to this PhD were that there could be additional biases or leading questions within the research. As an additional control, the interview protocols and information sheets used throughout the PhD were checked and approved by the research supervisor who has not been a part of the military in any way.

2.5. Ethical Issues

Given that the research was centred on PTSD, ethical issues and considerations are paramount. Due to the researchers' professional memberships and the nature of intervention that was designed, there were a number of different ethical guidelines that needed to be adhered to. These were:

- British Psychological Society (BPS) Ethics Guidelines for Internet-mediated Research (BPS, 2013)
- British Psychological Society Code of Ethics and Conduct (BPS, 2009)
- British Psychological Society Code of Human Research Ethics (BPS, 2010)

The BPS Ethical Guidelines for Internet-Mediated Research has four overarching principles of: respect for the autonomy and dignity of persons; scientific value; social responsibility, and maximising benefits and minimising harm (BPS, 2013). The BPS Code of Ethics and Conduct has four guiding principles of respect, competence, responsibility and integrity (BPS, 2009). The BPS Code of Human Research Ethics contain the same four principles as specified in the Guidelines for Internet-Mediated research. These are respect for the autonomy and dignity of persons, scientific value, social responsibility and maximising benefits and minimising harm (BPS, 2010). However, this guideline also includes specific details on: risk; valid consent; confidentiality; giving advice; deception; debriefing; ethics reviews, and research with specific types of population (BPS, 2010).

In addition to these professional ethical guidelines, ethical approval was sought and granted by The School of Medicine Ethics Committee at The University of Nottingham (see Appendix B). The process of gaining ethical approval from this committee required applicants to submit full details of the purpose of the study, the proposed methods to be used, how the results will be analysed, the materials that will be used, information on managing issues as they arise, any relevant professional standard that needs to be met and expected timelines for the study.

Once submitted, the documents were reviewed, scrutinized and where necessary clarifications, alterations, or more information was requested and subsequently provided. It was only once the committee were satisfied that the research in its entirety met the standards set out by the university that ethical approval was granted. Due to the nature of the research for this thesis and the time constraints associated, ethical approval for all studies was submitted at the same time. There were no research deviations from the details contained in the documents

submitted for ethical approval made when the research was conducted that required additional submissions to the ethics committee.

2.5.1. Participant distress.

Participant distress was the most prominent ethical consideration when conducting research into military veterans who are either suffering from or have suffered from PTSD. Given what has been stated in Chapter 1 about PTSD, this was to be expected. This ethical point is reflected in all three ethical guidelines (BPS, 2009; BPS, 2010; BPS, 2013). Specifically, when speaking to participants about unpleasant memories that have caused physical and mental stress there was a risk that recalling these memories could re-trigger the issues that they had previously experienced.

To minimise this risk of participant distress, all participants were fully informed of the purpose of the study prior to taking part. They were given the right to withdraw at any stage should they have felt the need to stop. Participants were also given details of support agencies, charities and helplines upon completion of, or withdrawal from, the study. Fully informed consent was sought from all participants prior to taking part in the study. Self-report screening measures were completed by each participant before they were included in the studies to ensure that they were no longer suffering from PTSD or not experiencing symptoms of PTSD that were too severe (where appropriate). The details of these questionnaires are detailed in Chapter 5.

2.5.2. Confidentiality.

Maintaining participant confidentiality (that the participant will not be identifiable; Bell & Waters, 2014) was a key consideration, especially when conducting research with vulnerable participants. This ethical point is reflected in all 3 guidelines (BPS, 2009; BPS, 2010; BPS, 2013). Specifically, during all stages of

research participants' confidence needs to be kept, data are held securely and not shared, no specific or identifiable information on participants are discussed outside of a research context or with anyone not directly involved in the research and the researcher needs to always have full control of the data collected.

In order to ensure that these ethical points were adhered to, participant names were not recorded in any research documentation where participants were assigned a participant number and any documentation that referred to a participant number did not contain any participant names. The internet hosting server did not save in detail participant information outside of the bare minimum required for research purposes. Additionally, there were regular targeted database environment resets.

2.5.3. Informed consent.

Informed consent (where an individual agrees to participate in research after the full purpose, risk, benefits and process of the study have been described and understood; Marshall, 2007) with no deception unless 100% required and was critical to a study as it is key to ensuring participants feel safe and comfortable with the research that they will be participating in. This ethical point is reflected in all 3 guidelines (BPS, 2009; BPS, 2010; BPS, 2013). This ethical guideline is necessary to protect both the researcher and the participant. The participant needs to know the purpose of the research, what it requires, and how it will affect them.

In order to ensure that this ethical guideline was adhered to, participants were given information sheets prior to their agreement to participate in the study (see Appendix C for an example). The information sheet gave details of the purpose of the study, the outcomes that were expected from the interview (i.e. open and honest data to be collected for analysis) and participant withdrawal information.

Once the participant agreed to take part in the study, they were asked to sign a participant consent form (see Appendix D).

2.5.4. Anonymity.

Anonymity (that the research will not be able to identify participants based on the responses; Bell & Waters, 2014) was key to the research required for this PhD and was a key consideration when a researcher is asking participants to disclose sensitive mental health issues. This ethical point is reflected in all three guidelines (BPS, 2009; BPS, 2010; BPS, 2013). This was key to participants feeling able to give full, honest and open responses to all aspects of the research.

In many cases, the participants specifically asked not to be identifiable and for their raw data not to be shared. None of the participants' personal information was recorded outside of what was necessary for the purpose of the research or shared with any individuals who were not directly involved in the research. Data were stored such that if participants were included in more than one study it was not possible to match responses without specific information from the researcher. These records were then destroyed once the link to data was no longer required.

2.5.5. Giving advice.

Within the realms of this PhD topic, competence and the giving of advice/fulfilling the correct role is key. This ethical point is reflected in all three guidelines (BPS, 2009; BPS, 2010; BPS, 2013). This guideline states that as a researcher, unless qualified or competent (where appropriate), it is not suitable to give advice, to conduct counselling sessions or to fill an advising role. Should any of these needs be required during interview sessions, the researcher should stop data collection and refer the participant to a professional for further help.

To ensure the researcher adhered to this guidance an information sheet was created which was given to the participant at the end of each interview session. This sheet contained details of individuals or charities that they could contact should they require further assistance. In addition to this, participants were informed at the start of each interview that if they require help or need to withdraw then the session would stop immediately and they would be able to seek further professional help.

2.6. Data Analysis

Across the studies completed for this thesis both qualitative and quantitative data were collected. A variety of data analysis techniques were used. For quantitative analysis, statistical significance was defined as $P < 0.05$ and SPSS 22 software (IBM corp) was used to analyse the data. Statistical analysis was conducted on the effect of the independent variable (the variable being controlled by the researcher; Field, 2013) of using the technology-enabled intervention on the dependant variable (the variable being measured; Field, 2013) in respect of the PTSD scores.

As the purpose of the second and final studies were to establish the thoughts and feelings of the interviewees, interpretive phenomenological analysis was used. NVIVO 10 (QSR) was used to analyse the qualitative data. All qualitative data was analysed using Interpretative Phenomenological Analysis (IPA). The reason for choosing IPA for the analysis is that IPA focuses analysis on the meaning, experiences and process instead of to events and their causes (Larkin & Thompson, 2012). IPA focuses on interpreting phenomenology and the study of “being”, which is the aim of the qualitative research aims and understanding the lived experience recovering from PTSD., IPA was done using six steps given by Smith, Flowers & Larkin (2009). These steps are:

1. Reading and re-reading
2. Initial noting
3. Developing emergent themes
4. Searching for connections across emergent themes
5. Moving to the next case
6. Looking for patterns across cases

Chapter 3: Study 1. The Effectiveness of Individual Psychological Treatment for PTSD: A Systematic Review

3.1. Introduction

In order to fulfil the first step of the framework for developing complex interventions set out by MRC, a systematic review was conducted. This chapter analyses and reviews the literature on individual psychological therapies for PTSD available over the last 10 years. It examines the available academic papers and reviews them based on a quality and suitability assessment. It is important to understand what has been effective in PTSD treatment in the past in order to inform future interventions. A systematic review was conducted in order to review existing literature on individual therapies for PTSD in a systematic, scientific and thorough way. This chapter presents the method and results of this review.

A systematic review is a review that identifies relevant papers, assesses the quality of the papers and summarises the results of these papers using scientific methodology (Khan, Kunz, Kleijnen & Antes, 2011). This was chosen as it is the most appropriate form of review and is recommended as a part of the MRC framework for creating interventions. Narrative analysis (looking at a broad range of issues of one topic as opposed to a single topic in great depth; Cook & Murlow, 1998) or Meta-analysis (statistical combining of results from a number of studies; Khan et al., 2011) were not determined suitable for this study as they would not have provided enough details to allow for an intervention to be developed.

3.1.1. Background.

Over the past 10 years there has been significant progress in the treatment of PTSD (Forbes et al., 2012). As mentioned in Chapter 1 there are two approaches to treating PTSD, one of which is psychological therapies. Different psychological therapies have been found to be effective in reducing PTSD symptoms (Bisson et

al., 2013). As stated in Chapter 1, psychological therapies can take place in different modes. There are also different types of psychological therapies (such as exposure based or cognitive based; Bisson et al., 2013) which have all been proven to be effective in reducing the symptoms of PTSD. Research indicates that different types of traumatic experiences are treated more effectively with different forms of treatment (Bisson et al., 2013). However, what has yet to be systematically reviewed is the effectiveness of individual psychological interventions on treating PTSD.

There are many types of individual interventions available for treating PTSD that are readily accessible. However, not all of these have been scientifically validated and confirmed as being effective. As a starting point to creating technology-enabled intervention, understanding what has been validated and tested within scientific experimental rigor is key.

3.1.2. Scoping.

A preliminary search of the Cochrane Library (the gold standard for mental health systematic reviews (Green-Hennessy, 2013) was conducted on June 15th 2016 to establish what systematic reviews have been published on the topic of PTSD. The reason for this was to establish if an existing similar review was conducted previously. This is a key step as Cochrane reviews, by requirement, are constantly being kept up to date with the latest research and are specifically for literature reviews within the medical field (Gulmezoglu & Villar, 2003). The search identified 29 (out of 9432) publications with the key search term PTSD, of which only 6 were relevant. In addition, a preliminary search of online academic databases and of Google Scholar was conducted for any relevant systematic reviews. Any duplicates (from those that appeared in the Cochrane Library) were removed, this resulted in a total of eight relevant published reviews on PTSD. These were:

- “Psychological debriefing for preventing posttraumatic stress disorder (PTSD)” (Rose, Bisson, Churchill & Wessely, 2002)
- “Psychological therapies for chronic post-traumatic stress disorder (PTSD) in adults” (Bisson, Roberts, Andrew, Cooper & Lewis, 2013)
- “Multiple session early psychological interventions for the prevention of post-traumatic stress disorder” (Roberts, Kitchiner, Kennardy & Bisson, 2009)
- “Psychological, social and welfare interventions for psychological health and well-being of torture survivors” (Patel, Kellezi & Williams, 2014)
- “Early psychological interventions to treat acute traumatic stress symptoms” (Roberts, Kitchiner, Kenardy & Bisson, 2010)
- “Internet-based cognitive and behavioural therapies for post-traumatic stress disorder (PTSD) in adults (protocol)” (Lewis, Roberts, Bethall & Bisson, 2015)
- “Efficacy of virtual reality exposure therapy in the treatment of PTSD: a systematic review” (Goncalves, Pedrozo, Coutinho, Figueira & Ventura, 2012)
- “Psychological treatment of post-traumatic stress disorder” (Bisson & Andrew, 2009)

As can be seen in the above list, there have been a large number of systematic reviews conducted into the PTSD intervention literature with specific psychological focus. However, none of the papers look specifically to answer the research question ‘What psychological interventions on a one to one or individual basis have been found to be effective in the existing literature’. Therefore, a systematic review specifically examining the effectiveness of individual interventions for PTSD is required.

3.1.3. Aims.

In order to fulfil the aims of this PhD there were two primary aims for this initial study and systematic review. The first was to review and understand what is currently being offered as psychological intervention for PTSD, with a specific focus on what is effective on an individual basis. The second was to review and understand which of these were effective on military personnel. An unexpected third outcome was to review the effectiveness of technology-enabled psychological interventions for PTSD.

A systematic review of randomised controlled trials (RCT) conducted on psychological interventions for PTSD that could be undertaken on an individual basis to improve PTSD symptomology is the most rigorous way to achieve this objective. The effectiveness of psychological treatments will be determined using a reduction of PTSD scores on validated clinical PTSD scales as the outcome measure for the studies included. This method provides a clear framework and methodology to search through high volumes of literature that is scientifically sound.

3.1.4. Research questions.

The following research questions were addressed:

- a) What psychological interventions on an individual basis have been found to be effective in the existing literature?
- b) Of these, which were tested on military personnel and how effective are they on military populations?
- c) Of these, which were interventions driven by technology and how effective were these?

3.2. Method

The methods and reporting procedures employed were in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses checklist (PRISMA; Moher, Liberati, Altman & The PRISMA Group, 2009). This is the recommended and most used checklist when conducting systematic reviews in psychology research (Moher et al., 2009).

3.2.1. Search strategy.

The search strategy and terms were specifically designed to identify literature in relation to the effectiveness of individual psychological (non-pharmaceutical) interventions designed to treat PTSD in those over the age of 18 years. Effectiveness is assessed by the reduction of severity of PTSD symptoms post intervention.

3.2.1.1. *Electronic searches.*

This review was conducted using three online academic databases. These were PubMed, ScienceDirect, PsycInfo, and Web of Science. Searches on the databases listed were specifically set to find papers published between 2006 to 11th June 2016, with a top-up search conducted on 11th July 2017 to cover more recent publications. 2016 covered the previous 10 years of research and was agreed with the PhD supervisor. The following search terms were used for searches on all of the online databases listed above:

post-trauma* OR posttrauma* OR PTS* OR (traumatic stress) OR (post-traumatic stress) OR (posttraumatic stress) OR (traumatic stress disorder) OR (post-traumatic stress disorder) OR (posttraumatic stress disorder)

AND

treatment OR therapy OR intervention OR CBT OR (cognitive therapy) OR (cognitive behavioural therapy) OR psychotherap* OR (psychological therapy) OR (psychological treatment).

The rationale for the time frame of the search is that with the release of the latest DSM in 2013 (APA, 2013), the latest studies can be included in relation to DSM-5 and taking into account any research completed on the previous DSM, which is still prominently referred to in research contexts today.

3.2.1.2. *Searching other sources.*

The reference lists of the selected papers and papers used in Chapters 1 and 2 for this thesis were manually searched for relevant literature. Websites, Google, and Google Scholar and text books were also searched for relevant research.

3.2.2. Eligibility criteria.

Once papers were identified and the full text downloaded, they were assessed to determine whether the study was relevant. Any articles that were deemed as possibly relevant and representing aa RCT were then read and assessed according to the inclusion and exclusion criteria (see table 5) to determine whether the paper would be appropriate to be included in the review. The reference lists of the selected studies were searched manually for any applicable papers that may not have been found through the online searches. The papers that were relevant were downloaded and assessed for relevance according to the eligibility criteria.

Table 5

The Inclusion and Exclusion Criteria for Literature Selection

	<u>Inclusion</u>	<u>Exclusion</u>
Traumatic stress definition	Stress resulting from a traumatic event PTSD defined by DSM 5, IV, III, III-R	All other definitions of traumatic stress PTSD defined by all ICD versions
Population	Experienced a traumatic event Over 18 years of age Male or female	Under 18 years of age (children, adolescents)
Study Type	Randomised controlled trial Psychological treatment compared with placebo (or other control) or another psychological treatment	Reviews Opinion pieces
Exposure to treatment	Any psychological intervention for the treatment of PTSD conducted on an individual basis	Evidence of psychoticism Comorbidity affecting the outcome Taking medication (unless on a stable regimen, without changes throughout the treatment during the research period)
Language	English language publication	Non-English language publication

3.2.3. Quality assessment.

The quality of the studies included in the final selection was assessed using the Critical Appraisal Skills Programme Checklist for RCT (CASP; CASP, 2018). The CASP was used to identify the risk of bias in each included study and to assess whether the authors of the study have addressed the identified potential sources of bias (see Appendix L for an example of an assessment for Spence et al., 2011). Inter-rater reliability was used, with the PhD supervisor acting as the secondary rater.

3.2.4. Data Extraction.

A data extraction form for this systematic review was created (see Appendix E). The data extracted from each paper were:

- Lead author
- Year of publication
- Sample size
- Demographic information on participants (age, sex, ethnic background)
- Details of the traumatic event
- Sampling (randomisation) method
- Type of the psychological intervention(s) used
- Nature of control condition (placebo or other)
- Duration
- Results

All data were entered into the data extraction form. This allowed for an aggregated view of data from all the selected papers.

3.3. Results

3.3.1. Search Results

The systematic search of the three databases mentioned above yielded a total of 3436 publications. When search results from all sources was combined and any duplicates removed, 3100 papers remained. The titles and abstracts of the 3100 were downloaded and reviewed for keywords suggesting the presence of any exclusion factors children, adolescents, non-English language publications, pharmacological interventions included in the study). This resulted in 351 remaining publications for further review. The full texts of the 351 remaining publications were further examined, resulting in 36 potentially relevant randomised controlled trial studies to be quality assessed. Searching the reference lists of the 36 papers did not result in any new papers being included in the final quality assessment. Full analysis of the full texts of these 36 articles against the inclusion and exclusion criteria and quality assessment resulted in 11 papers to be included in this review. A representation of the selection process has been shown in Figure 4.

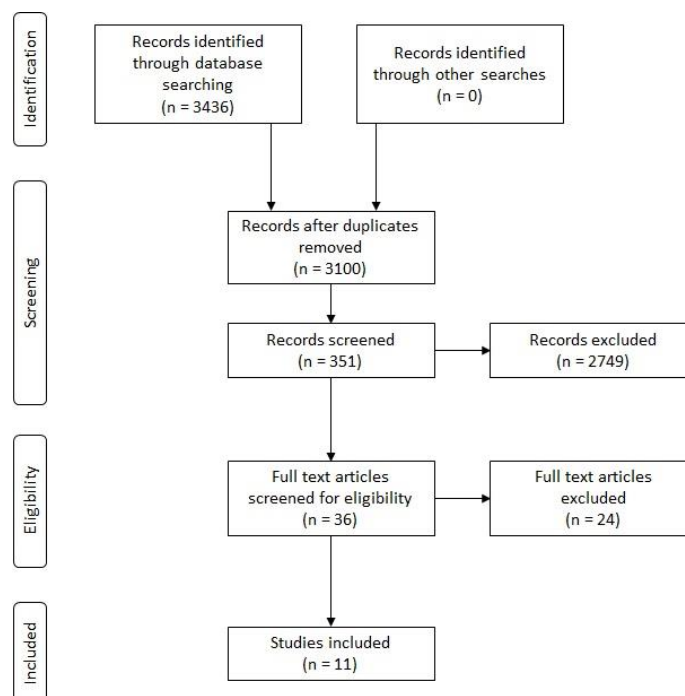


Figure 4. PRISMA Literature Selection Flowchart.

3.3.2. Included Studies

11 publications were included in this systematic review. A list of the included studies and the journal information can be seen in Table 6. The details of these studies are below.

Table 6.

Summary of Included Studies

<u>Lead Author</u>	<u>Year</u>	<u>Title</u>	<u>Journal</u>
Maercker, A	2006	Dresden PTSD treatment study: randomized controlled trial of motor vehicle accident survivors	Journal of Consulting and Clinical Psychology
Basoglu, M	2007	A randomized controlled study of single-session behavioural treatment of earthquake-related post-traumatic stress disorder using an earthquake simulator	Psychological Medicine
Knaevelsrud, C	2007	Internet-based treatment for PTSD reduces distress and facilitates the development of a strong therapeutic alliance: a randomized controlled clinical trial	BMC Psychiatry
Sijbrandij, M	2007	Treatment of Acute Posttraumatic Stress Disorder with Brief Cognitive Behavioural Therapy: A Randomized Controlled Trial	The British Journal of Psychiatry
Neuner, F	2008	Treatment of Posttraumatic Stress Disorder by Trained Lay Counsellors in an African Refugee Settlement: A Randomized Controlled Trial	Journal of Medical Internet Research
Spence, J	2011	Randomized controlled trial of internet-delivered cognitive behavioural therapy for posttraumatic stress disorder	Depression and Anxiety

<u>Lead Author</u>	<u>Year</u>	<u>Title</u>	<u>Journal</u>
Forbes, D	2012	A multisite randomized controlled effectiveness trial of cognitive processing therapy for military- related posttraumatic stress disorder	Journal of Anxiety Disorders
Nijdam, M. J	2012	Brief eclectic psychotherapy v. eye movement desensitisation and reprocessing therapy for post-traumatic stress disorder: randomised controlled trial	Journal of Consulting and Clinical Psychology
Sloan, D. M	2012	Written exposure as an intervention for PTSD: A randomized clinical trial with motor vehicle accident survivors	BMC Psychiatry
Ehlers, A	2014	A Randomized Controlled Trial of 7- day Intensive and Standard Weekly Cognitive Therapy for PTSD and Emotion-Focused Supportive Therapy	American Journal of Psychiatry
Knaevelsrud, C	2015	Web-Based Psychotherapy for Posttraumatic Stress Disorder in War-Traumatized Arab Patients: Randomized Controlled Trial	American Journal of Psychiatry

3.3.3. Characteristics of included studies.

The number of participants across all the included trials ranged from 31 (Basoglu, Salcioglu & Livanou, 2007) to 277 (Neuner et al., 2008). The total number of participants across all studies included is 1154. 5 studies included over 100 participants. Ehlers et al., (2014) had a total of 121, Knaevelsrud, Brand, Lange, Ruwaard & Wagner (2015) had a total of 159 participants, Neuner et al., (2008) had a total of 277 participants, Nijdam, Gersons, Reitsma, de Jongh & Olff., (2012) had a total of 140 participants and Sijbrandij et al., (2007) had a total of 143 participants. Ages across all participants ranged from 18 to 68. The sex of participant was split by 703 females and 451 males across all 11 studies.

The cause of the participants' trauma reported in the studies ranged from military trauma (n = 59 from 1 study), natural disaster (n = 31 across 1 study), interpersonal violence (n = 514 across 4 studies), accidents (n = 88 across 2 studies) and various traumatic events (n = 560, across 3 studies). The settings for the studies were Turkey (one study), Germany (three studies), Amsterdam (two studies), Australia (two studies), America (one study), Africa (one study) and England (one study). All studies included individuals who participated in research at least three months after the traumatic event resulting in the development of PTSD.

3.3.4. Measures used to assess PTSD.

There were a wide variety of measures used to assess PTSD across all of the included studies. Five studies used the CAPS in either Turkish (Basoglu et al., 2007), German (Maercker et al., 2006) and English (Ehlers et al., 2014; Forbes et al., 2012; Sloan, Marx, Bovin, Feinstein & Gallagher 2012). Two studies used the IES-R (Mijdam et al., 2012; Knaevelsrud & Maercker, 2007). Two studies used The Posttraumatic Stress Diagnostic Scale (PDS; Knaevelsrud et al., 2015; Neuner et

al., 2008). One study used the PCL (Spence et al., 2011). One study used the Structured Interview for PTSD (Sijbrandij et al., 2007).

3.3.5. Interventions.

In order to get meaningful results, data were grouped into the different overall methods as given in chapter 1, section 1.5. These are: information processing therapies; cognitive; behavioural and emotional therapies, and exposure therapies.

3.3.5.1. *Information processing therapies.*

One study focused on EMDR (Nijdam et al., 2012). A significant results of a reduction in PTSD scores, based on the IES-R, from an average of 39.4 to a score of 17.67 was reported in the study.

3.3.5.2. *Cognitive, behavioural and emotional therapies.*

One study focused purely on behavioural therapy (Basoglu et al., 2007). Significant result of a reduction in PTSD scores, based on the CAPS, from an average of 63.1 to 30.2 was reported in the study. The control group also reported a reduction in average PTSD scores from 62.3 to 49.1 (Basoglu et al., 2007).

One study focused on cognitive therapy (Ehlers et al., 2014). A significant result of a reduction in average PTSD scores, based on the CAPS, from an average of 78.82 to 20.96 was reported in the study (Ehlers et al., 2014).

Six studies focused on CBT (Knaevelsrud et al., 2015; Knaevelsrud & Maercker, 2007; Maercker et al., 2006; Nijdam et al., 2012; Sijbrandij et al., 2007; Spence et al., 2011). A significant result of a reduction in PTSD scores, based on the IES-R, from an average of 47.6 to a score of 12.3 were reported in the studies with the

control group also reporting score reductions of 41.8 to 35.2 (Knaevelsrud & Maercker, 2007; Maercker et al., 2006; Nijdam et al., 2012). The study using the PDS as a measure of PTSD showed significant average score reductions from an average of 30.35 to 20.29 with the control group reporting score reductions of 30.65 to 30.17 (Knaevelsrud et al., 2015). The study using the CAPS showed an average PTSD score reduction of 60.78 to 44.78 (Spence et al., 2011). The study using the Structured Interview for PTSD showed an average score reduction of 34.3 to 22.1 with the control group reporting score reductions of 36 to 29.4 (Sijbrandij et al., 2007). The study using the PCL as a measure for PTSD showed an average score reduction of 60.78 to 44.78 with a control group showing an average score reduction from 57 to 51.79 (Spence et al., 2011)

One study focused on CPT (Forbes et al., 2012). A significant result of a reduction in average PTSD scores, based on the CAPS, from an average score of 75.53 to 48.03 was reported (Forbes et al., 2012).

One study focused on emotion-focused supportive therapy (Ehlers et al., 2014). A significant result of a reduction in average PTSD scores, based on the CAPS, of 74.6 to 47.88 with the control group showing score reductions of 69.95 to 65.28 were reported (Ehlers et al., 2014).

3.3.5.3. Exposure therapies.

One study focused purely on written exposure therapy (Basoglu et al., 2007). A significant result of a reduction in average PTSD scores, based on the CAPS, of 62 to 11 was reported in the study with the control showing a reduction from a score of 71 to 60 (Basoglu et al., 2007).

One study focused purely on NET (Neuner et al., 2008). A significant result of a reduction in average PTSD, based on the PDS, of 25.9 to 5.4 was reported (Neuner et al., 2008).

3.3.6. Results with military personnel.

Of the included studies, only one studies focused on military personnel (Forbes et al., 2012). The total number of participants across all studies was 59 with a male/female split of 57 and 2 respectively. The measures used to assess PTSD in the study was the PCL-5.

The intervention method used in the study was CPT. The study found that the CPT was significantly effective in reducing PTSD symptoms. The figures reported in the study (figures show in Chapter 1, section 1.5.2) provide evidence that CPT significantly lowers PTSD scores in military personnel (Forbes et al., 2012; Resick et al., 2015).

3.3.7. Results using technology.

Of the included studies, three focused on technology-enabled interventions (Knaevelsrud & Maercker, 2007; Spence et al., 2011; Knaevelsrud et al., 2015). The total number of participants across all studies is 278 with a male/female split of 61 and 217 respectively. The measures used to assess PTSD in the three studies were the PDS, the PCL, and the IES-R.

3.4. Discussion

The aim of this systematic review was to assess the effectiveness of existing individual psychological interventions for PTSD and answer the research questions listed in Chapter 1, section 1.8 and Chapter 3, section 3.1.4. The analysis of the interventions was split into three parts: an overall review, a review

in relation to interventions that were validated with military personnel as participants and a review of technology-enabled interventions.

The review of the included studies found that cognitive, behavioural and emotional based interventions were the most highly researched forms of intervention for PTSD. All interventions that were included in the review were found to be significantly effective at reducing PTSD symptoms. When the studies were broken down into the two additional analysis categories of military personnel as the participant subset or technology-enabled interventions, it was found that there were contrasting demographics to the overall participant sets included in the review. Studies that featured military personnel only as participants were predominantly male whereas studies that feature technology-enabled interventions were predominantly female. All included studies showed results that include that the PTSD interventions validated in the RCTs were effective at reducing PTSD symptoms.

3.4.1. Main findings.

A total of 12 studies with 1,264 participants were included in this review. The quality of the evidence provided for all the included studies fell within the quality assessment criteria, but many of the studies had fewer than 100 participants. However, all the studies included in the review reported control group versus treatment group scores in PTSD. This provided evidence showing that those in the treatment group improved significantly more than those in control groups.

There was only one study that fell into each of the categories of information processing therapy and EMDR and only two fell into the category of exposure therapies (however only one in each type of exposure therapy). As a result, it is difficult to establish the effectiveness of EMDR across a wide range of populations and/or settings. The majority of studies (N = 10) that were included

in this review fell into the category of cognitive, behavioural and emotional therapies. All forms of cognitive, behavioural and emotional therapies were found to be highly effective in reducing PTSD scores.

Both studies that were included using military personnel as participants used CPT as the type of intervention. As such, this did not give a diverse picture of effective individual treatments for PTSD for this participant subset. However, in both studies, CPT was found to be highly effective in reducing PTSD scores. This does provide evidence that CPT is a main method of intervention for PTSD for the military population and is highly recommended for this population set.

All studies that focused on technology as a method for delivery used CCBT as the form of intervention. This mirrors the results for the included studies for military personnel in that it gives a very one-dimensional view of how technology can be used in the treatment for PTSD, and therefore how effective this treatment can be. However, all studies were consistent in reporting that CCBT was effective in reducing PTSD scores. As can be seen in chapter 1, section 1.5.4, the post-intervention PTSD scores were significantly lower as a result of CCBT. This is despite the fact that technology-enabled intervention, rather than traditional intervention, was utilized.

3.4.2. Limitations.

There is a high risk of bias in the search methodology when using electronic database searches. Firstly, depending on the search engine, database and subscription levels given to the user or institution, search results tend to vary (give older, new or focused results). Additionally, hand searching is limited to the physical resources available at the time of searching and Google algorithms are such that historical searches will impact on the results even if the browsing history is deleted. Further, non-English or non-peer reviewed studies were not

included in the systematic review. This automatically discounted interventions that were currently being used at some charitable foundations.

Another final bias that should be highlighted is the difference in the sex ratio of participants between the descriptive statistics for all included studies and the descriptive statistics for studies focusing on military personnel. Overall, the male/female ratio was almost 50:50, with marginally more females (52%) than males (48%) included in the 12 included studies. However, when only looking at the studies that were conducted with military personnel as the participants, the sex split heavily favoured males (94% males). This indicated that the percentage of females in all non CPT intervention studies was relatively high. However, the percentage of males in the studies focusing on military personnel is generally representative of the general military population in 2016 (89.8% male; MoD, 2016). Thus, the results of the review can be widely generalizable within a military context.

There are no specific reasons found in the existing scientific literature to explain the higher female percentage for research into technology found in the systematic review. However, the researcher used results from the military and results from technology as a main driver for the main two intervention types to include in the technology-enabled intervention created.

3.4.3. Applicability of findings.

The findings of this systematic review of the literature helped to inform the technology-enabled intervention for PTSD created for this PhD. The systematic review gave the researcher a clear, scientific and replicable method of establishing the most effective psychological interventions available to reduce PTSD symptomology. This allowed the researcher to have more meaningful conversations with veterans when discussing their experiences of interventions.

The systematic review gave the researcher an evidence-base to allow for a preliminary decision to include CPT and CCBT in the technology-enabled intervention at a minimum.

Chapter 4: Study 2. Veterans' Perspective on PTSD Treatments Received

4.1. Introduction

In order to fulfil the first step of the framework for developing complex interventions set out by MRC of developing an intervention and partially to fulfil the second step, interviews with military veterans was conducted. This chapter looks at the perceptions of UK military veterans in relation to any psychological intervention they received to treat PTSD in the UK. It examines the personal experiences and individual thoughts of how they experienced their recovery. The perception of a treatment is key to a positive outcome from treatments (Lippens & MacKenzie, 2011) and is therefore especially important when designing self-help psychological interventions. Research found that 80% of people who self-reported as satisfied or happy with the treatment they received for any mental health issues also reported that they found their treatment to be effective. The remaining 20% did not find treatment to be effective (Lippens & MacKenzie, 2011). It is therefore extremely important to understand what has been perceived to be effective in PTSD treatment in the past and to not just assess effectiveness of interventions based purely of a reduction in PTSD score. This chapter will present the method and themes that emerge from the interviews conducted.

4.1.1. Aims.

In order to fulfil the aims of this PhD, it was important to review and understand what is currently being available as psychological intervention offered for PTSD and how participants feel about these treatment options. This study aimed to provide a detailed assessment of participants' perceptions of the psychological interventions that they have undertaken. It sought to establish the most and least effective therapeutic factors of these interventions and the reasons for these perceptions. This subsequently helped to inform the design of the technology-enabled intervention.

4.1.2. Research questions.

The following research questions were addressed:

- a) Of the interventions that have been experienced, what did participants find to be the most effective?
- b) What did participants find the least effective?
- c) Should there be an option of technology-enabled treatment, would participants have considered using it?

4.2. Method

In order to provide insightful analysis and meaningful results a wide breadth of topic areas need to be considered. To explore these topics fully, the participants needed to be asked specific questions and given the opportunity to respond in any way and in as much detail they felt appropriate. This allows for rich data to be collected and will provide an in depth insight and understanding of the participants' thoughts and feelings. Consequently, an open ended semi structured interview was selected. This allows for collecting rich data in a structured and directed way.

4.2.1. Sampling method.

Opportunity sampling methods were used (people from target population available at the time and willing to take part; Krosnick, Lavrakas & Manicai, 2014). Participants were recruited through personal contacts within charity organisations, via Facebook, through forums, through online support groups, and from individuals who had taken part in the researchers' earlier studies. Adverts, posts and links to the studies were posted online, emailed and spoken about. Participants contacted the researcher to ask to be included in the studies.

4.2.2. Participants.

A total of 12 participants aged between 36 and 52 years were interviewed. The participant sex ratio was 10 males and 2 females. All participants self-selected into the study. Participants were recruited through a mixture of advertising on social media, forums and through personal contacts with connections to the military.

The exclusion criteria for this study in addition to those listed in Chapter 2, section 2.2 are that the participant continues to self-report as experiencing PTSD, self-report as completing PTSD treatment in the last 2 months and those who self-report as currently suffering from any other mental health disorder.

While the participants did not all know or recall the type of intervention that they experienced, from the description of the interventions given the researcher was able to provide an educated guess as to the type of intervention experienced. The majority of participants experienced CPT ($n = 9$) or CBT ($n = 4$) as a method of intervention. Only two participants experienced EMDR with five participants participating in psychological intervention that was not defined (unique to a specific charity). All participants either attempted self-education and/or self-help options prior to attending a formal intervention.

4.2.3. Interview schedule.

To research veteran perceptions of treatments that they have already received, an interview schedule with 17 questions was developed and used (Appendix A). The questions were designed specifically to ascertain how participants felt about treatments they have received, what worked, what didn't work and their perception of how effective the treatment they received was. The secondary objective was to ascertain their thoughts on whether a technology-enabled intervention would be utilized if available. Questions were grouped into three

sections: their experience of the most and least effective parts of existing treatments (question 2 to 10), what was felt to be missing from the treatment options and interventions (questions 11 to 14), and their thoughts and perceptions of the possibilities for technology-enabled interventions (questions 15 to 17). The interview schedule can be seen in appendix A.

The outcome of the analysis of these interviews was used to inform the design, sections, and user flows of the technology-enabled intervention. Participants were interviewed either via telephone or in person (the location was defined by where both the participant and researcher were most comfortable with).

4.2.4. Procedure.

Once recruited, participants were asked to read the information sheet provided and gave their informed consent to participate in the study and for the interview to be audio recorded. Participants were informed that they could withdraw at any point during the interview and could ask for their data to be removed from the study within one month of the interview taking place. Names were not recorded where requested by the participants. All interviews were under three hours in length. Once the interviews were completed, verbatim transcription took place by the researcher.

4.3. Results

The interview data collected was are categorised into three sections: perceptions of treatments to date, thoughts on how these could be improved upon and technology-enabled treatments perceptions. These three sections came out of the analysis and were based on the sections of the interview schedule. For ease of understanding, they are presented accordingly.

4.3.1. Perceptions of treatments to date.

The main themes that emerged when analysing data collected under the section of questions relating to perceptions of treatments that have been undertaken were: a comfort in confirming and discussing the issue; the therapeutic relationships; relationships with peers, and intensive focus.

4.3.1.1. *Comfort in confirming and discussing the issue.*

A key theme that came out of the interviews was that participants found that they were finally able to confirm they were in fact experiencing mental health issues and accept that they were suffering from a mental health issue (specifically PTSD) and openly acknowledge it. There was a general sense from the participants that even though they were fairly sure that they were suffering from something until it was made clear to them what they were dealing with, they felt helpless in doing anything to get better.

“it was just [pause] a difficulty in sleeping, suddenly panicking, this constant pit in my stomach that I just [pause], I just couldn’t define or remove.... After I finally got the courage to seek help and confirm what was wrong, taking the next step was [long pause] very difficult but I felt better in my decision”
[participant 11]

“I always suspected that I was experiencing the after effects...I mean, you hear about it – it’s talked about a lot, all around you know...but, but until you get to the point where you are sitting in the session and able to, to, define something, it’s hard to start to, to take the right steps to deal with it, y’know?” *[participant 9]*

The above quotes highlight that it was not that they were blind to the fact that they were suffering from a condition that they should do something about. It was more that it gave the participants a solid construct to use as a starting point to begin to understand and manage their emotions. It seems that the ability to confirm exactly what was wrong was an important stepping stone in creating an altered state of mind which would subsequently allow them the ability to start to deal with the issues they knew they had.

Participants also found comfort in being able to talk about events that happened to them, events that they had suppressed for long periods of time. The ability to express their guilt and perceived fault in the events was a break through point to allowing their healing to begin. When discussing the most effective part of the intervention experience, one participant highlighted that they had not spoken of, or acknowledged their PTSD, as they were convinced that they were at fault for what had happened and therefore for what they were experiencing as a result of the traumatic event. The ability to discuss these thoughts helped to alleviate the guilt they had, which was being made worse by suppression of thoughts and emotions.

“It was such a, an enormous relief to finally admit my part in what happened. To say it out loud. In a way, I think, I was looking for forgiveness. For someone to tell me it was okay, and that I I wasn’t a bad person. It was the only way I could face myself again, give myself permission to – move past...permission to find myself.” *[participant 11]*

There was also a profound relief in the participants that they were not losing their minds. Whilst there seems to be a generic understanding of PTSD in the wider world, in the military it is still not widely discussed. The freedom to

acknowledge that they were experiencing something that was a natural reaction to their experiences was reported as being liberating and comforting.

“I’ve kept in touch with the guys, we’re tight, but none of the others ever mentioned anything like what I was going through. I thought it was just me, that I was weak or there was something wrong with me....when I finally got help, I realised I was not the only one – that was a major relief!”

[participant 1]

“it was weird, after so long of feeling – abnormal, strange, uncomfortable. I was finally able to move towards resolving these feelings and things I was thinking. That there were others in the same boat made me feel good, I mean, bad but in a good way.” *[participant 3]*

“Finally accepting that I had PTSD, being able to define it in my head, knowing that it would just keep getting worse unless I did something, faced it, that shook me. That’s it, that was the moment I knew I had to do this, get better.”

[participant 9]

Due to the way that PTSD is perceived as a weakness and the way in which military personnel are trained to get the job done and not show emotion, there was no clear idea to the participant of others who were going through the same things that they were. Taking part in the intervention sessions allowed them to physically see others in similar situations to their own and therefore were able to share experiences and gain an understanding that people were going through the same things. This process seemed to help in the recovery process.

Across all participants, there was a profound sense of comfort in being able to finally open up. Many participants made reference to the fact that in the military there is a culture of “shutting up and getting on with the job”, not “showing weakness” and there are expectations that “certain things are kept to yourself”. Once they crossed the barrier or non-disclosure, there was a reported perception of feelings in the participants of taking the first step towards recovery and understanding.

“It took a while, but once I felt like I could open up, talk about things, just talking about the story, saying it out loud meant that I could understand myself what I was really thinking. It was almost as though talking about it and explaining it to someone else showed me that I had stopped really knowing what happened, like it no longer really made sense”

[participant 4]

Whenever the therapist conducting the sessions was mentioned during the interviews, there was always a strong emotional reaction (both positive and negative). The reactions shown by participants made it clear that the ability and skill of the therapist was in fact a key differentiator to how effective the individual would perceive an intervention to be. If there was any doubt in the therapist or a perceived lack of understanding felt by the participants, there was an immediate reaction of becoming defensive and closed. This led to participants feeling less able to open up and therefore less receptive of what was being said and being asked of them.

4.3.1.2. *The therapeutic relationship.*

A key role in how the participant felt about the intervention was the relationship between the participant and the therapist. The participants felt that their relationship with the therapist was a very important consideration in how effective the intervention turned out to be. Participants found that positive and trusting relationships helped in the recovery process.

“My therapist, he didn’t push me too hard, there was a respect there, for me, my experiences. I really felt as though I could say things, be blunt, and not be judged. He understood the nature of the job, that vulnerability. It helped me not have to focus on what I was saying – trying to justify what happened. Instead I could focus on what was being asked of me” *[participant 2]*

“I felt that there was a real understanding of what it is like to be in the military, what we go through, the training we have. It made it easier to open up, to get to the real problem, as because they knew that it wasn’t normal or easy to be open about what happened it was easier to be open – I guess that doesn’t make sense.” *[participant 1]*

“I was worried going in that I couldn’t be helped. That it would be a lot of time, money and effort to get no benefit at the end. The therapist, she made me see that I could improve, that there was light at the end of the tunnel. I gave me hope and the courage to share my story.” *[participant 4]*

“I trusted that one person, the person I could give my emotions to, which wasn’t normal. There wasn’t anyone else that would get me to tell them what I was thinking. Getting to that point was difficult, but once I got there – it all came out.”

[participant 9]

The participants were able to confront and talk about their traumatic memories with a therapist that they were comfortable with. They managed to build a positive trusting relationship, which allowed them to feel safe enough to recall awful memories. This gave participants confidence that they would be able to get better, placing their trust in the therapist. The extent to which participants felt they were allowed to take their time and reveal only what they were emotionally ready to at that particular moment in time was something that aided in the recovery process. There was a sense that if they were pushed too hard at the wrong time, progress would have stalled or even regressed.

Participants also felt that a therapist that had an understanding of or military experience held more credibility than a therapist who did not have this understanding. This credibility resulting from an understanding of the military helped to increase trust and enable faster rapport building between participant and therapist. The participants report being put at immediate ease and felt that they could use military centric language without the need to explain terminology or why they behaved in specific ways.

Conversely, when they felt pressure or any levels of pretention or judgement, it had a detrimental effect on the effectiveness of the intervention. There was a recognition that the therapeutic relationship experienced by some made things worse.

“She just sat there, with all these letters after her name – letters that mean nothing to me. I thought that she would help, but there was just something about it all that I couldn’t stomach. It was like I was forced to reveal my most intimate secrets to some stranger who would use it against me”
[participant 8]

“I was put under so much pressure to talk, to put into words something that I couldn’t understand, couldn’t think of. There was no understanding or sympathy.” *[participant 5]*

“I knew instantly that we were not going to get along – there wasn’t a instant liking. It was almost an instant disliking, or at least a mistrust that I couldn’t get past!” *[participant 7]*

The participants all expected for their therapist to fill a service provider style role, where it was more of a transactional interaction. If this basic level of psychological agreement was violated the participant would then feel unable to trust and respect the therapist. Additionally, if participants did not feel they were being given trust and respect by the therapist, there was a negative perception of the treatment. In all cases, these were treatment options that were found to be highly effective in reducing PTSD in military veterans in the past.

A part of being a professional seemed to be knowing the right time to push the participant further and get more information of the story and events and knowing when to step back. This seemed to give participants confidence in the abilities of the therapist. Participants reported that there was an importance placed on acting in a professional manner and maintaining a professional

relationship. This gave participants confidence that they were being treated by therapists who were qualified and experienced in what they do.

“He was very professional, knew a lot and seen a lot. It gave me confidence. He didn’t get too friendly, which was exactly as I was expecting. We built a good relationship.” *[participant 10]*

“He didn’t try to enforce a relationship, he kept things about business. I like that. I was very much focus on the problem – no personal chat unless it was relevant.” *[participant 2]*

“I have been injured, a real serious, um, injury.....the people that helped me, they treated this in the same way that I was treated with a physical injury...It made me feel respected. It helped them feel like they knew what they were doing. Professional, like they really understood” *[participant 1]*

Another aspect of this subtheme was that the lack of interest in personal information allowed the participants to feel like they were being given respect and that the therapist really understood the difficulty in emotional and personal relationships that resulted as a part of PTSD. Many participants reported that building and maintaining personal relationships was difficult. By not placing pressure on the participant to bond on a personal level, therapists were able to increase their credibility.

4.3.1.3. Relationship with peers.

This subtheme focuses on the fact that participants felt that there were others in the same positions who they could relate to and identify with. This seems to have given participants the feeling that they were not suffering alone, that there were others who went through very similar experiences which resulted in the same issues and reactions. This seemed to have aided in the healing process as it gave comfort to participants and allowed them to understand that experiencing PTSD did not mean that they were weak. Many of these points came from group therapies and residential treatments.

“I thought it would be uncomfortable...but hearing others experiencing the same thing helped me to feel less guilty, like it was a thing, it wasn’t just me...it’s actually something that OTHER people experience.” *[participant 2]*

“When you’re in the same room, with other people with the same experiences as you, with the same problems, it give you a sense of being together – that if we work together then we can all get through it” *[participant 10]*

“We’re all in the same boat, been through the same process to get to that session, and this has helped – like it wasn’t just that we were being difficult or un-helpable. It was a system that did not work for everyone. It felt like we could help each other move forward” *[participant 3]*

There seemed to be a mutual benefit in being able to share experiences with peers. This may stem from the military culture of being in a close knit team and

trusting this team with your life. There was comfort and hope in participant knowing that they were not alone and could see improvements in others.

However, even though there was a feeling of relief reported by participants, it was combined with an element of not wanting to share some personal experiences and feelings with people that they didn't know. Even when they know that the experiences were similar, some of the military background, training and culture held participants back. Thought processes and mind-sets within participants still existed where they identified as being part of very definite teams and groups that do not share information with each other. This caused difficulty in getting individual experiences resolved.

"I just couldn't overcome my training – sharing with a wider group was too unnatural. It would have been hard enough to speak to just one person. It was too full, too much to deal with, I couldn't manage it!" *[participant 5]*

"I wasn't expecting to have many people in the room, I would have preferred just to be in a session with no one else there....it felt confrontational, as though I was being accused of something...I didn't know enough to trust what would be done with the information. I needed to protect myself."
[participant 8]

This falls into the other side of the spectrum of being in close knit groups whereby there is a culture of not sharing information past what is necessary and pre-approved. Therefore, this impeded the healing processes. This inability to get past the culture was something that all participants reported feeling.

4.3.1.4. Intensive focus.

A theme found during analysis is the intensive focus required in the sessions and the long periods of time that were required and what was asked of the participants during the sessions. Unanimous agreement that the sessions involved a very intensive period of time that required a high amount of focus and will power. There seemed to be an embedded fear of the level of intensity being asked of participants. Participants reported that they were unsure that they could handle the constant revisiting of the traumatic event when sessions began.

“It was full on, there was nowhere to hide. I couldn’t pretend that there was nothing wrong, nothing bothering me. It was called out, it was expected. I had to face it, face all of it, make sense of it....like one day it was all filed away – under ‘do not open’ and the next day it was like ‘you must remember this, remember the detail, all of it’. That leap, taking the first step...It made me accept what happened.” *[participant 12]*

“It doesn’t matter if it happened year ago, it was like uncovering a wound that never healed properly, taking the plaster off and picking at it. Picking at it until there was nothing left there that wasn’t clean bone. That was what it was like. Tearing away at it all until there was just a clear, obvious story left, one that allowed me to move past my past, to then start to heal...painful at first but it becomes cathartic, and suddenly it’s done” *[participant 4]*

“My first attempt at explaining what happened, at looking at the actual events, it went badly. Nothing I was saying,

thinking, feeling, hearing was making any sense. I wanted to forget about it, to leave it all behind again. But I couldn't. In that environment, in the setting, the designs, the work, everything, forces you to face it – over and over, day after day.” *[participant 8]*

It seemed that in some cases the participants were not expecting to have such an immediate recounting of the traumatic event. Other participants had avoided thinking about what they were going to have to do. However, this did not necessarily impede on the effectiveness of the intervention, just the perception of it. Going from actively avoiding and suppressing their experiences, thoughts and emotions to being actively encouraged to do the opposite was a shock to the participants. It disrupted their normal behaviours. However, when participants reflected on the initial stage of getting used to talking, thinking about and engaging with the traumatic event and associated emotions it was seen as a turning point.

It was not just the intensity of the sessions that added to the feelings of intensive focus. The residential setting helped to create focus. Most of the participants seemed to appreciate the submersion and ability to share in the experience. However, this seemed to have a negative effect in a few of the participants.

“It was also at meal or down times, where we would just be hanging around. Coming together, finding common interests, common experiences. We could talk openly and freely, knowing that we had all experienced the same struggles. We would share. We knew we were all there for the same reasons.” *[participant 2]*

“When I went for meals, you could see in others that they were drained from the day, mentally drained and ready to drop it all and have some fun. I would look across the room, catch the eye of someone, and we would know – just know that it would get better for us. That helped more than you can imagine. That feeling of being together, feeling like we would never let each other down, that somehow we would all have to face tomorrow” *[participant 10]*

Creating focus on all the events and details for one extended period of time to allow for complete and unbroken focus allowed for participants to be clear on what the issue was. This focus also ensured that there was an inability to run away from the problems they were facing. The constant reminder of the circumstances that led the participants to be in the same place at the same time allowed them to bond, which increased the sense of a team culture within the therapeutic group. This in turn increased the feelings of a safe and trusting environment and created a stronger support network. As a result, the participants felt better able to open up during formal sessions.

There was also a perceived benefit in the ability to speak with other veterans who were going through the same treatment at the same time outside of formal sessions. Once trusting relationships and atmospheres were built, there was an increased comradery which allowed participants to support each other more effectively throughout the sessions.

However, some participants reported that there was not enough down time, time away from negative thoughts. They reported being very aware that they were “locked into facing your worst thoughts without escape”. This came out

prominently when participants raised concerns of needing to be able to lock it away and get on with everyday life.

“Sometimes, I thought to myself, it’s all too much, I need to get away for a short period, live a normal life for a period, without a constant reminder that I had an issue, without the need to constantly think about or analyse what it is I was thinking, if it was a good or bad thought, how I could change it, if I should be changing it” *[participant 2]*

“It was difficult to switch off. I was very aware that I was there for a purpose. It felt like I was living at school, always being watched, without fail...I know that wasn’t true, but I couldn’t shake the feeling. I would sometime just shut myself off, I think being in my own surroundings might have helped. Allowed a bit of perspective.” *[participant 7]*

The perception was that even if there was a small amount of time to think about other things, it would have been an overall more pleasant experience. When constantly staying in a location where they were receiving treatment, participant felt increased pressure to constantly show signs of improvement. They felt that this pressure would have been reduced if there was more time allocated to being offsite.

4.3.2. Thoughts on how treatment could be improved upon.

When talking about things that could be improved upon one theme came up consistently throughout the interviews. There was an overall feeling that during the treatment sessions themselves, nothing much could be improved upon apart

from small individual preference issues such as “I would have preferred more information printed” or “I would have liked a set time in which to do the ‘homework’”. These were all very specific to different personalities and often were likely to have been resolved at the time if the issue or question had been raised. The theme centres around before and after care.

The feelings that the participants shared was that there needed to be more information provided before the sessions started. This information should include details of what to expect to allow participants to be better prepared mentally for what would be expected of them. The reason given for this was that, overall, participants feel like there would have been more value to the first couple of sessions.

“I was given information about where to be, when, what time to arrive, how long I would be there for. All practical things. I would have like to have had a bit of warning of the things that I would be doing. It was tough to go in blind. It’s just not something I really do!” *[participant 7]*

“I can see now why I didn’t get too much information about what was coming up – I mean, if I had known I may have just gone MIA, y’know. But I still think time to prepare for that emotional onslaught would have made it easier” *[participant 9]*

“It was like the first day of school again – not knowing anyone, being dropped off with a good luck and no clue what was coming. Looking back, it was fine at the time – we are trained to just deal with what situations are thrown at us. But

at the same time – things go better with at least a little information.” *[participant 1]*

While scene setting and before care were issues raised, the most prominent feeling for an areas of improvement centred around after care. Participants felt that they should have been given more in terms of post-intervention and post ‘getting better’. Participants who successfully completed a set of sessions felt as though they were in a good place to manage a residual or momentary return of symptoms or thought that they were completely recovered. However, as time passed some participants began to sense that they were not 100% better. They felt that they had dealt with the main problems but it became clear that there would be some things that would never stop being an issue. In these cases, there was a sense that they had just learned to cope much better with any lingering issues.

“It was like, I was better, I felt more in control, happier, more comfortable. Then one day, a few months later, I felt really uneasy, like something in the pit of my stomach. I thought I was back, I wasn’t better. It passed. But I think that if there was better follow up, or a point of contact there that I could speak to” *[participant 6]*

“even though I was told that I could reach out at any point, it didn’t really feel like it. I think a follow up session or two, just to check in would have been helpful. There were instances, um, past that time that I felt it would have been good.”
[participant 8]

“Some clear guidance to do in moments when you wake up in panic, and think that you’re right back there again, in the thick of things, flashing back – something we could turn to – materials or even a post care log or worksheet or anything”
[participant 10]

“It’s like we were better, and that was it. They didn’t care anymore. What would happen if we needed more help – or had a sudden turn? Would we be right at the start again, back to a waiting list?” *[participant 3]*

There is an overriding perception from participants that they did not want to let the therapist down. In some cases, participants reported that they felt they had failed. It was felt that being offered a set of follow up appointments would allow participants to feel more comfortable and able to reach out and allay fears that they would be perceived as a failure.

Participants who reported positive experiences of the interventions they experienced and positive therapeutic relationships still felt that once they had completed the intervention, they were no longer the therapists’ problem. There is a general feeling that more needs to be done outside of simply telling participants that they can reach out if required.

4.3.3. Technology-enabled treatment thoughts.

The main themes that came out when discussing thoughts on using a technology-enabled intervention were the user interface and concern for personal mental health and information. When asked, all participants were happy to try to use a

technology-enabled intervention. However, there was some trepidation in terms of how it would work and if working in isolation would be effective.

4.3.3.1. User Interface.

There was a general agreement across all of the participants that the user interface and how the system will work will have a high impact on if they would use the intervention. One of the main points raised was around the fact that if it was visually unappealing or it was too difficult to follow or complicated to understand what needs to be done it would discourage continued use.

“It would depend on how it looks and feels, if it was easy to use. I feel like treatment was hard enough. If it was then difficult to navigate through and hard to read then I would give up pretty fast.” *[participant 1]*

“It would have to be clear what the instructions were, and be very user friendly. I feel like interaction with people would be missing, so you would have to replace that with something.” *[participant 12]*

“If I would have to sit at a screen and focus my attention on words rather than interaction with a person, it had [best]...be easy to use and nice to look at. I don’t even like technology, but I would do it if it were a nice experience, I guess.” *[participant 5]*

This provides evidence that participants would only be willing to persevere with using a digital intervention option should it function almost flawlessly. Considering that the perceptions were that the traditional face to face therapies

were effective, there was trepidation in participants when it came to trying any other method that was not easy to use or did not give an overall professional feel.

4.3.3.2. *Concern for personal and mental health information.*

There was a distinct concern about personal information being stolen. With the increases in recent times of cyber security breaches, this is understandable. There is still the perception that data being held on paper is less likely to be stolen and sold and is therefore more secure.

“...I would worry about where the information would be kept, how would it work? Can anyone just see the information on there? If I was sure that it was all safe then I would try it!”
[participant 8]

“I think something is better than nothing, but actually only if that something is not going to make things worse. If you can protect against that it would work, having been there – I feel like it would be worse to have something confirmed and then be left worse off.” *[participant 4]*

“I’m always up willing to try something new, but I don’t like to take unnecessary risks....I like to have enough information before putting myself in those situations to be able to make a decision” *[participant 11]*

Individuals were generally willing to try technology-enabled interventions, even with a low-level risk in data security breach. They also wanted to be sure that

they were given a sufficient amount of information to make an informed decision about if they wished to progress with the technology-enabled intervention.

Participants were also concerned that they would be left to their own devices 100% of the time. They felt that there might be times where it would be difficult to continue or times where extra emotional support might be required.

“Will there be someone linked to it, a real person that we can reach out to, should something go wrong?” *[participant 6]*

“If there is a human element to it, someone that can help us if we get stuck, or have questions for explaining what we need to do?” *[participant 12]*

“Will it be possible to access a person, a trained therapist if things got really bad?” *[participant 10]*

The participants wanted the comfort of having someone available should they feel the need to immediately speak with someone. This would allow for participants to feel comfortable with exploring highly distressing and emotional topics.

4.4. Discussion

This chapter sought to understand the perceptions of veterans in relation to the psychological interventions that they had received for PTSD in the past. The results suggest that participants connected more to the emotional processing, social support and feeling of the given intervention than the in detailed processes of what they had to do and specifics of the treatment. The other key finding from the research shows that even within those who subsequently develop PTSD,

there were significant individual differences in preferences and managing symptoms.

This personal preference and individual differences side of perception of treatment effectiveness and most effective parts can be explained by the large amount of research into personality differences in PTSD. Personality differences have been found to be predictive of how an individual will develop (Skogstad et al., 2013) or maintain PTSD (Mochcovitch, Nardi & Cardoso, 2012). It logically follows that these personality differences would also influence how PTSD interventions would be perceived.

Thoughts given on why the intervention worked well stemmed from participants feeling relief and comfort in being able to finally disclose events and emotions that they have hidden for so long, the relationship with both peers and therapists and the fact that there could be an intensive focus on these issues they were experiencing. The aspects that were perceived as not working well also fell into these themes with the converse point of view being put forward. An extensive search was conducted to establish if there was much previous research into perceptions of treatments, however there were no relevant search results.

A possible explanation for the differences in opinion that was suggested is that individual differences in the likelihood of developing PTSD, the cultural and biological differences and the personality profile of an individual not only plays a part in the experience of PTSD but on the perceptions of the effectiveness of different aspects of the PTSD intervention. Feeding into this, previous research conducted by the current researcher as a part of an MSc found that certain aspects of the psychobiological model of personality (Cloninger, Svrakic & Przybeck, 1993) were predictive of PTSD onset.

There have been theories put forward suggesting that there is a role that an individuals' emotional profile impacts on PTSD treatment experience (Power & Fyvie, 2013) however this should be researched in more depth. PTSD is a mental health condition that is highly emotive in experience and perception even by those who have not experienced PTSD and therefore any research to enhance our understanding of PTSD from an emotional perspective will be beneficial. The outcome of this research could help build a model to aid in our understanding of the complexities of PTSD interventions. Related to the emotional aspect of PTSD research has shown that there are physical alterations in the emotional circuits in the brain as a result of chronic trauma (Wang et al., 2016). Understanding these complexities and emotions can help to create more effective interventions.

The aspect of emotional processing of an event, outside of the practical parts of an intervention, is what the participants felt about the intervention. This ties in with research that shows that social support, or perceived emotional and social support can moderate the development of PTSD (Platt, Keyes & Koenen, 2014). The fact that there was a heavy emotional and social support aspect of PTSD treatment in itself is not surprising, however the way that this has manifested itself in this study is thought provoking. Research does indicate that treatment can be more effective in having a diverse social support group and not just having a support group (Platt et al., 2014). This may contribute to the findings from these interviews. Having a variety of professional and peer support in close proximity and within easy reach can improve perceived and actual intervention effectiveness.

A limitation of this research is the types of interventions that have been experienced by participants are heavily cognitive in nature, which produced emphasis on the intensive focus over a long period of time. Future research into a wider range of participants and treatment options would provide a richer picture

of perceptions of PTSD interventions and aid in the development of additional psychological interventions for PTSD.

Another limitation to this study is that all of the participants completed psychological interventions for PTSD that resulted in their symptoms reducing to the extent that they no longer met the diagnostic criteria for PTSD. Therefore, the data were retrospective, which may have resulted in a positive halo effect. In addition, there is likely to be some personality differences and outlooks to those who not only undertook treatment but were willing to speak openly about their experiences.

Finally, participants gave the impression that they were happy to at least try a technology-enabled intervention, with a number of caveats in relation to the regular or complete use of the intervention. This ties in with research into other similar studies that tested technology-enabled interventions for mental health issues which shows that user friendliness and adaptability is key (Kuhn et al., 2014). The implications of these results to this PhD are that the researcher needed to carefully consider the design of the intervention and how easy or intuitive the intervention is to use. While participants were willing to accept that the intervention would be self-administered, a complete lack of emotional and social support and ease of use would not be overlooked.

The results from this study did, however, give the researcher a good basis for the designing of the technology-enabled intervention. This insight was used to inform the proceeding study and provided useful insights into the perceptions of some existing interventions.

In conclusion, despite the perceived importance of emotional and social support as being necessary to successful intervention for PTSD, participants would be

willing to trial technology-enabled intervention for PTSD. However, continued use of the intervention to completion of an intervention would depend on a number of factors. The general consensus that having something to help treat PTSD was perceived as being better than having nothing. However, the design, purpose and functionality of the technology-enabled intervention required careful thought in order to reduce attrition rates.

Chapter 5: Study 3. The Effectiveness of a Technology-enabled PTSD Intervention for British Military Veterans

5.1. Introduction

In order to fulfil the second step of the framework for developing and evaluating complex interventions set out by the MRC a longitudinal study over 27 months was undertaken. This chapter presents the methods and statistical results from the trial of the technology-enabled intervention. It aims to provide a clear understanding of the methods used to create the intervention and assess how effective the intervention is in reducing PTSD symptomology (both on an overall PTSD score reduction and a criteria level) in those who have used it.

Modern mental health research has started to focus on bringing the field in line with new technology. Indeed, in an increasingly digital world, the Internet of Things has started to take off and intelligence systems are growing rapidly (Cognizant, 2017). Technology will continue to play a large role in modern lives with increased wearable and portable technologies being developed for a myriad of reasons. Initial published academic research into technology-enabled interventions for mental health issues (in this case specifically PTSD) have reported successful reductions in symptomology (e.g. VRET, Nelson, 2013, PTSD Coach App, Kuhn et al., 2014).

There is a plethora of virtual communities (e.g. online support groups or internet forums) that specifically centre on issues relating to PTSD, as well as sexual violence, child abuse, loss and grief. Typically, there is a focus on providing information and offering outlets for individuals to share and discuss experiences with others (Knaevelsrud & Maercker, 2007). The internet allows for a protected environment where participants can control and regulate intimacy without fear of judgment or rejection (Knaevelsrud & Maercker, 2007). Thus, developing more

effective and varied options for technology-enabled PTSD treatment would be beneficial and may reduce fear of stigma or judgment associated with PTSD.

5.1.1. Research aims.

In order to fulfil the aims of this PhD, a technology-enabled intervention was developed and hosted on the World Wide Web. The aims of this study were to set up and test a free to use technology-enabled intervention to aid in reducing PTSD symptom severity.

5.1.2. Research questions.

The following research questions were addressed:

- a) Does the technology-enabled intervention reduce PTSD symptoms?
- b) Which symptoms is it most effective in reducing?

5.2. Method

5.2.1. Sampling methods.

Opportunity sampling methods were used to identify the people from target population available at the time and willing to take part (Krosnick et al., 2014). Participants were recruited through personal contacts within charity organisations; via Facebook; forums; online support groups, and from individuals who had taken part in the researchers' earlier studies. Participants all self-selected into the study using the online intervention. Adverts, posts and links to the studies were posted online, emailed and spoken about.

5.2.2. Participants.

A total of 798 participants aged between 23 and 59 years registered on the intervention webpage between February 2015 and May 2017.

5.2.3. Measures.

Demographic details of sex, age, military service, and personal military experience was collected. In order to establish the effectiveness of the technology-enabled intervention, a reduction in the symptoms of PTSD needed to be shown across a veteran population.

5.2.3.1. PTSD.

There are numerous validated scales used to measure PTSD or PTSD symptomology as discussed in Chapter 1, section 1.4. The PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (PCL-5) was deemed the most appropriate for this research. The justifications for this are that at the time this measure was required for programming into the technology-enabled intervention, the latest version of the DSM had just been released and the PCL-5 was one of the only measures validated against DSM-5 at the time. This measure is also recommended by the Department of Veteran Affairs (DVA; DVA, 2017) and has been validated within civilian (Blevins, Weathers, Davis, Witte & Domino, 2015), military (Wortmann et al., 2016) and veteran populations (Bovin et al., 2016). The previous versions of the PCL were also one of the most widely used self-report measures for PTSD (DVA, 2017). PCL-4 (which was validated against DSM-IV) was also specifically validated against a military population and a different version was released to measure PTSD in the military population (DVA, 2017).

The PCL-5 is a 20 item self-report measure that corresponds to the symptoms of PTSD listed in DSM-5 (Bovin et al., 2016). Respondents rate their symptom severity on a 5 point Likert scale ranging from 0 ('Not at all') to 4 ('Extremely'). Of the 20 items on the scale 9 remain the same as in the PCL-4, 5 are only slightly revised, 3 are significantly revised, and 3 are new items (Bovin et al., 2016). Examples of items on the PCL-5 include "Suddenly feeling or acting as if the

stressful experience were actually happening again (as if you were actually back there reliving it)” and “Trouble remembering important parts of the stressful experience”.

The total symptom severity score is the sum of the scores for each response of the 20 items (range 0-80). The score can further be broken down into the PTSD symptom cluster. Severity scores can be calculated by summing the following items: 1-5 for cluster B; 6 & 7 for cluster C; 8 – 14 for cluster D, and 15 – 20 for cluster E (Blevins et al., 2015). When tested on a veteran population an overall internal reliability of $\alpha = 0.96$ was found (Bolvin et al., 2016).

5.2.3.2. Combat exposure.

It is important to measure combat exposure due the impact that it has on military personnel (as stated in Chapter 1). To measure combat exposure, there are limited options of self-report measures available. These measures also only cover a small amount of scenarios (Carvalho, Pinto-Gouveia, Cunha & Motta, 2014). The options are: the Combat Experiences Scale of the Deployment Risk and Resilience Inventory-Revised version (DRRI-2; Voget et al., 2013); the Combat Experiences Questionnaire (CEQ; Carvalho et al., 2014), and the Combat Exposure Scale (CES; Keane et al., 1989). The CES was chosen as it is the one that stands out in the research (Carvalho et al., 2014) and is the one that is recommended by the DVA (DVA, 2017).

The CES is a seven item self-report measure whereby participants rate events on a five point Likert scale ranging from one (‘Happened to me’) to five (‘Doesn’t apply’). Examples of items on the CES include “Transportation accident (for example, car accident, boat accident, train wreck, plane crash)” and “Other unwanted or uncomfortable sexual experience”. The final score is an aggregate of the scores for each individual item. The score for each item is calculated in a

unique way. The total maximum score is 41 with lower scores showing low levels of combat experience and higher scores showing high levels of combat experience. Combat experience outcome categories are: 'light' (0-8); 'light-moderate' (9-16); 'moderate' (17-24); 'moderate-heavy' (25-32); and 'heavy' (33-41; Keane et al., 1989). The internal reliability for subscales of the CES range from $\alpha = 0.64$ to $\alpha = 0.83$, with an overall internal reliability of $\alpha = 0.85$ (Keane et al., 1989).

5.2.3.3. *Life events.*

In addition to combat exposure, Chapter 1 also indicated that an important factor to consider when researching PTSD is the life events of the individual. There are a number of self-report measure available to measure life traumatic events. These include the Traumatic Life Events Questionnaire (TLEQ; Kubany et al., 2000), The Life Events Checklist-5 (LEC-5; Weathers et al., 2013), The Stressful Life Events Screening Questionnaire (SLESQ; Goodman, Corcoran, Turner, Yuan & Green, 1998) and the Trauma History Questionnaire (THQ; Green, 1996).

The LEC-5 was chosen for this study. The justification for this is that it was recently revalidated and updated to the fall in line with DSM-5 (Weathers et al., 2013). Even though the psychometric properties are not currently available in publication for the LEC-5, there were minimal revisions from the original version of the LEC. A unique feature of the LEC is that it has items relating to multiple types of exposure to different types of potentially traumatic experiences and therefore may elicit information about experiences that may not otherwise be accounted for (Gray & Slagle, 2006). The LEC is also recommended as a screening measure for researchers and clinicians to establish what types of traumatic events were experienced in order to establish a trauma profile of participants (Gray & Slagle, 2006).

The LEC-5 is a 17 item self-report measure whereby participants report the number and types of life events experienced on a 5 point scale ranging from 1 to 5 based on either frequency (1 = “no” or “never” to 5 = “more than 50 times”), duration (1 = “never” to 5 = “more than 6 months”), frequency (1 = “no” to 4 = “more than 12 times”) or degree of loss (1 = “no one” to 4 = “more than 50%”; Keane et al., 1989). Examples of items on the LEC-5 include “Did you ever go on combat patrols or have other dangerous duty” and “How often did you fire rounds at the enemy”. There is no official score based rating for this scale, these items are all for background and context information. The internal reliability for the subscales of the LEC aligned to DSM-IV range from $\alpha = 0.39$ to $\alpha = 0.79$ (Gray & Slagle, 2006).

5.2.3.4. Wellbeing.

Increasing wellbeing by reducing PTSD symptoms is the ultimate aim of the research. There are numerous wellbeing self-report measures that have been validated and used in research. These include: The Warwick- Edinburgh Mental Well-being Scale (WEMWBS; Tennant et al., 2007); The ONS subjective well-being questions (New Economics Foundation [NEF], 2012), and The Oxford Happiness Questionnaire (Hill & Argyle, 2002). The WEMWBS was chosen for this study. The justifications for this are that in a review of wellbeing measures it showed as one of the strongest in terms of psychometric components (only 1 of 10 components not showing inconsistent psychometric values and 1 of 10 showing a 0 value; Lindert, Bain, Kubzansky & Stein, 2015). Further, it is a short time commitment scale, it has been widely used in population surveys in the UK (NEF, 2012), and has been used in studies on PTSD, mental health and posttraumatic growth (e.g. Flanagan, Patterson, Hume & Joseph, 2015).

The WEMWBS is a 14 item self-report measure whereby the participants rate items on a 5 point Likert scale with responses ranging from ‘none of the time’ to

“All of the time”. Examples of items on the WEMWBS include “I’ve been feeling interested in other people” and “I’ve had energy to spare”. The final score is an aggregate of the Likert scores for each individual item. The total maximum score is 70 points with low scores showing low levels of wellbeing and high scores showing high levels of wellbeing. The categories are: ‘low wellbeing’ (0-32); ‘below average wellbeing’ (33-40); ‘average wellbeing’ (41-59), and ‘above average wellbeing’ (60-70; Tennant et al., 2007). The internal reliability for the subscales of the WEMWBS range from $\alpha = 0.52$ to $\alpha = 0.8$, with an internal reliability of $\alpha = 0.91$ (Tennant et al., 2007).

5.2.4. The PTSD technology-enabled intervention.

Based on the systematic review and initial interviews, two existing manualised and effective psychological interventions were chosen. CPT and CBT. Due to time constraints the researcher could not add more than two interventions. Exact wording, details and protocols from the chosen measures and the CBT and CPT manuals were extracted and put into programming documents to send to the programmer (see Appendices F, G, H for examples).

The CPT manual was based on the standardised manual for CPT in military veterans (Resick & Monson, 2006). The elements included in the technology-enabled intervention (wording, flow, worksheets, information sheets) were taken directly from the manual and transformed into a digital form resulting in a different look and feel to the manual. The justification for using the digital form is that it had been proven to be effective in reducing PTSD symptoms in military veterans. The CBT manual was the PTSD Recovery Program, Therapist Manual (DVA, 2013), using the Royal College of Psychiatrists (RCPSYCH) CBT A self-help manual for anxiety and depression (RCPSYCH, 2010) as a guide for the look and feel of the information displayed. The justification for this is that the CBT manual devised the DVA is used regularly on military personnel and therefore is assumed

to be effective. However, it is not a self-help manual. The RCPSYCH's manual is a self-help manual for CBT but does not focus on PTSD. Therefore, it was a useful template for a look and feel guide for CBT.

User flow (see Appendix I) and use cases (see Appendix J for an example) to allow the programming to be completed were also created and sent to the programmer for execution. Numerous versions of each of the pages were created and edited based on preliminary feedback. All designs, usage, wording, and functionality decisions were made by the researcher. The technology-enabled intervention was designed to be used as a stand-alone self-education, self-help intervention or for signposting. The app consisted of four main sections of 'Access Professionals', 'questionnaires', 'help yourself improve' and 'information' (Figure 5).

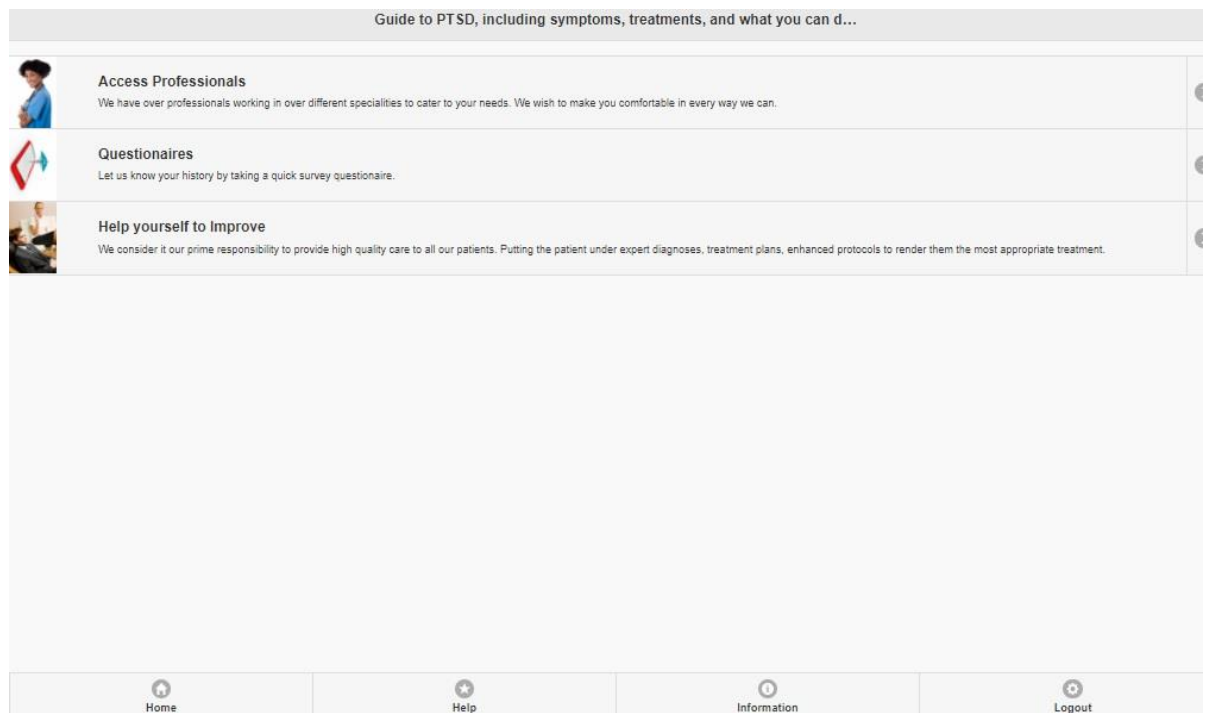


Figure 5. Home Page of Technology-enabled Intervention.

Section two, Questionnaires (Figure 7), displayed the four measures that are a part of the sign up and baseline process. Participants could choose to retake measures of PTSD or wellbeing at any time should they wish to. Once they completed the questionnaire they received tailored feedback based on the category their score fell into.

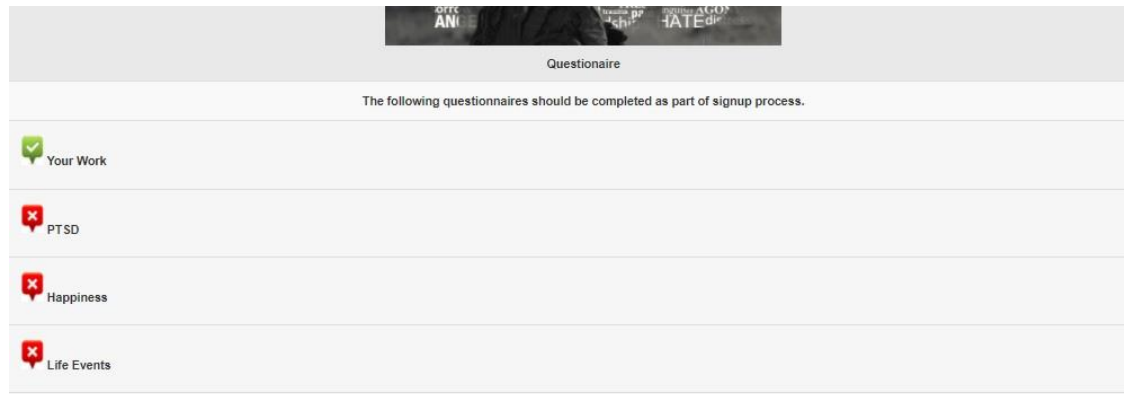


Figure 7. Questionnaire Page of Technology-enabled Intervention

Section three, Help Yourself Improve (Figure 8), provided the different intervention options. When the user selected the intervention option they wanted, the session page loaded and indicated which sessions have been completed and which session is the next to be completed. Each of the intervention option recommended weekly gaps between sessions. At the start of the first session of each intervention type, information was given on the intervention participants were about to undertake and set the expectations of the intervention. The participants were required to work through the sessions in order to progress as there was programming in the intervention to prevent the participants from skipping sessions. As the participants worked through the sessions, completed session were marked as complete. In the event that participants wished to restart the session from the beginning (session one), they were able to select the 'start new session' and wipe their progress on all sessions of that particular intervention.

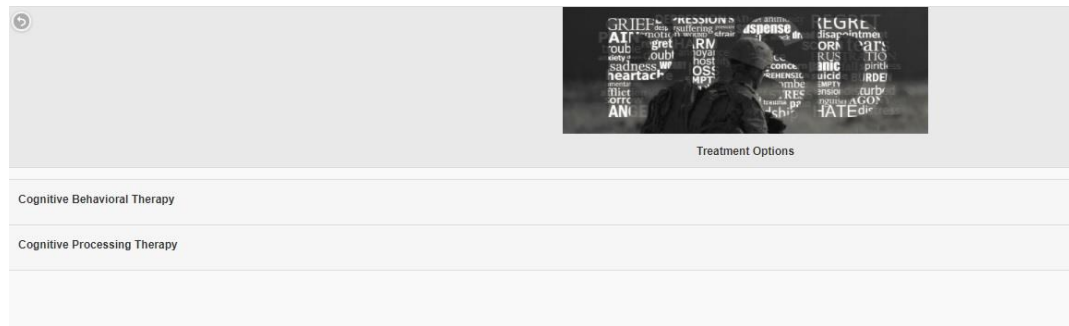


Figure 8. Help Yourself Improve Page of Technology-enabled Intervention

As mentioned above, each session started with an introduction to the session, where the aims are displayed and a review of the assignment took place. It then followed into the remainder of session. Each session contained information, questions and free writing text input sections (Figure 9 shows an example). Participants ran through the session items in order of appearance. Once the session was complete, at the bottom of the page, there was a link to the assignment documents and details of what was required to be completed in advance of the next session. The assignment documents were in a downloadable Microsoft word format.

• More than 10 times

How helpful did you find the following practice assignments since the last session?

- Not at all helpful
- A little helpful
- Somewhat helpful
- Very helpful
- Extremely helpful

Please read your impact statement out loud.

Now that you have read your statement out loud, look back and identify in your statement where there were decisions you made on how to handle the situation and how you handle these. List these:

For each statement consider ways that you think you could have handled the situation differently.

Now, consider if the way that you could have handled the situation differently requires hindsight, or is based on any emotions your feel after the event played out completely. Think about your emotions at the time and how they ha

Look at your statement again. Can you see any sweeping statements? Examples of these are:

- "all the time"
- "I can't trust my own judgement"
- "I am never"

Figure 9. Snapshot of an Intervention Session.

Section four, Information (Figure 10), provided psychoeducation about PTSD (e.g., symptoms and how PTSD develops). It included a section on when to get in touch with a professional and how to access professional care.

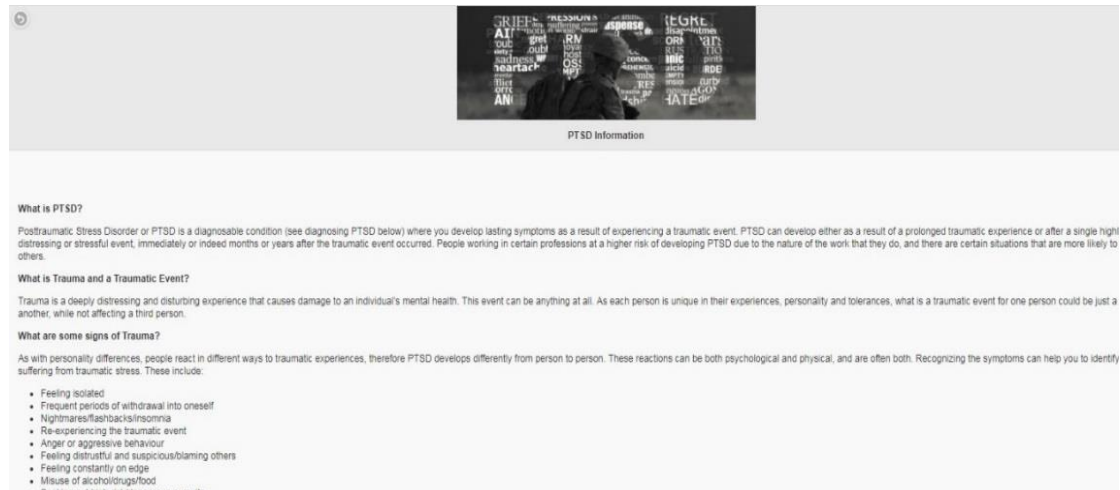


Figure 10. Information Home Page of Technology-enabled Intervention

5.2.5. Procedure.

Participants accessed the webpage by any internet browser (though it was optimised for Chrome) and were given the options to register or sign in. If registering, participants were shown the 'First time information' page, which displayed the information sheet and consent form. They were asked to read the information sheet and sign the consent form before continuing. Once informed consent was given, the participants were the directed to the initial questionnaire page where they completed the four baseline questionnaires. If PTSD scores were marked as being 'very high' (a score of above 50 or above), feedback given to the participants advised them to seek professional clinical or medical attention. If participants fell into this category, they will still able to continue to the intervention. The justification for the score of 50 or above was that this was the mid-range maximum score between responses of "quite a bit" (maximum score of 40) and "Extremely" (maximum score of 80). This threshold was agreed by the PhD supervisor.

Once the baseline questionnaires were complete, participants had full access to the website and there were no further mandatory sections. At their leisure, participants could explore the pages and access all the content. There were no time-outs programmed into the user experience. The website remained accessible to users for two years and three months for data collection. The website remained accessible to those who were already registered for a further 6 months, with no new users able to register. All the data collected by May 2017 was used in the quantitative analysis. At the start and end of each intervention, participants were asked to complete a PTSD questionnaire to assess PTSD symptom severity. If at any point the participant wished to reset the intervention and start again at session one, the participant could select the reset option.

Data were captured on a save page programmed into the website in a csv format that was extractable into Excel. The only data that were captured from the webpage were: baseline scores and demographic data taken at sign up, pre-intervention scores, post intervention, and completion scores. Due to time constraints usage data, session data and time spent in each session were not programmed save features.

5.2.6. Data analysis.

Quantitative data for overall PTSD score were analysed using repeated measures two-tailed ANOVA. The reason for choosing ANOVA is that the results were several measurements of the same dependent variable which were taken at different time points (Field, 2013). Quantitative data collected for PTSD clusters were analysed using repeated measures MANOVA. The reason for this is that the results were several measurements of the same dependent variable which were taken at different time points, however there were more than one measurement per individual across all time points (Field, 2013).

5.3. Results

The gender ratio was 552 males and 246 females. Of the participants that registered 132 registered but did nothing else, 337 registered and took the initial questionnaires only, 232 started using the intervention options and 98 participants completed at least one of the interventions. The overall attrition rate was 88%, the attrition rate of those who started but did not complete interventions was 58%.

The average age of the 98 participants that completed at least one intervention was 38 years with a range of 25 years to 57 years. The sex split was 75 males and 23 females. All participants self-selected into the study. Advertising for participants took place via social media sites, web forums and speaking to individual contacts with military and veteran connections.

Data were analysed in two parts: the overall change in PTSD score across all three time periods and changed in PTSD cluster B, C, D, and E scores over the three time periods. Of the participants that only completed the baseline measures, the mean PTSD score was 59.53 with scores ranging between 45 and 76, SD = 6.83.

5.3.1. Overall intervention effectiveness.

Participants completed questionnaires when they signed up, started and completed a technology-enabled intervention. Pre-checks were completed to ensure normality of the data (Kolmogorov-Smirnova, $D(98) = .07$, $p < 0.2$). As these were passed the assumptions of a repeated measures ANOVA were met. A repeated measures ANOVA with a Greenhouse-Geisser correction showed that the mean PTSD score differed significantly between time points [$F(1.75, 169.35) = 1493.27$, $p < 0.001$].

Post hoc pairwise tests, using the Bonferroni correction, revealed that PTSD scores increased by an average of .77 points between sign up and the pre-intervention questionnaire with a high insignificance ($p = 0.38$). Between pre-intervention and post-intervention scores of PTSD reduced by an average of 22.9 points ($p < 0.001$), and an overall reduction of PTSD scores between sign up and post-intervention scores by an average of 22.13 points ($p < 0.001$). Table 7 shows the mean overall PTSD scores, mean cluster level scores and standard deviations for sign up, pre and post-intervention.

Table 7

PTSD Scores at Sign-up, Pre-intervention and Post-intervention

	<u>Sign up score</u>		<u>Pre-intervention</u>		<u>Post-intervention</u>	
	N = 337		N = 232		N = 98	
	M	SD	M	SD	M	SD
PTSD	59.53	6.825	60.30	7.042	37.40	5.328
Cluster B	14.86	3.066	15.00	3.022	9.31	2.245
Cluster C	5.76	1.363	5.57	1.566	2.94	1.200
Cluster D	21.04	4.622	21.46	4.546	13.68	3.721
Cluster E	17.88	3.792	18.27	4.434	11.53	3.530

M = Mean SD = Standard Deviation

5.3.2. Cluster-wise intervention effectiveness.

A repeated measures MANOVA was used to analyse the intervention effects at three time points. As previously mentioned, participants completed questionnaires when they signed up, started and completed a technology-enabled intervention. There was a statistically significant difference in PTSD score based on the cluster specific score improvements, $F(8, 382) = 155.67$ $p < 0.0001$; Wilk's $\Lambda = 0.055$.

Post hoc repeated measures ANOVA with a Greenhouse-Geisser correction showed that across the Cluster B score differed significantly between time points [$F(1.78, 172.98) = 515.22, p < 0.001$]. Post hoc pairwise tests using the Bonferroni correction revealed that Cluster B Score increased by an average of .14 points between sign up and the pre-intervention questionnaire highly insignificantly ($p = 1$), between pre-intervention and post-intervention scores for Cluster B reduced by an average of 5.69 points ($p < 0.001$), and overall Cluster B scores between sign up and post-intervention scores by an average of 5.55 points ($p < 0.001$).

Post hoc repeated measures ANOVA with a Greenhouse-Geisser correction showed that across the Cluster C score differed significantly between time points [$F(1.81, 175.08) = 303.77, p < 0.001$]. Post hoc pairwise tests using the Bonferroni correction revealed that Cluster C Score decreased by an average of .18 points between sign up and the pre-intervention questionnaire highly insignificantly ($p = 0.54$), between pre-intervention and post-intervention scores for Cluster C reduced by an average of 2.63 points ($p < 0.001$), and overall Cluster C scores between sign up and post-intervention scores by an average of 2.82 points ($p < 0.001$).

Post hoc repeated measures ANOVA with a Greenhouse-Geisser correction showed that across the Cluster D score differed significantly between time points [$F(1.77, 171.88) = 414.26, p < 0.001$]. Post hoc pairwise tests using the Bonferroni correction revealed that Cluster D Score increased by an average of .42 points between sign up and the pre-intervention questionnaire highly insignificantly ($p = 0.53$), between pre-intervention and post-intervention scores for Cluster D reduced by an average of 7.78 points ($p < 0.001$), and overall Cluster D scores between sign up and post-intervention scores by an average of 7.36 points ($p < 0.001$).

Post hoc repeated measures ANOVA with a Greenhouse-Geisser correction showed that across the Cluster E score differed significantly between time points [$F(1.74, 168.66) = 400.83, p < 0.001$]. Post hoc pairwise tests using the Bonferroni correction revealed that Cluster E Score increased by an average of .39 points between sign up and the pre-intervention questionnaire highly insignificantly ($p = 0.52$), between pre-intervention and post-intervention scores for Cluster E reduced by an average of 6.74 points ($p < 0.001$), and overall Cluster E scores between sign up and post-intervention scores by an average of 6.34 points ($p < 0.001$).

5.4. Discussion

In order to fulfil the research aims and answer the research questions posed in Chapter 1, section 1.8 and Chapter 5, section 5.1.2, a longitudinal study over a 27-month period was undertaken to research the effectiveness of a technology-enabled intervention for PTSD in UK military veterans. The intervention was informed in design by the previous two studies and focused on cognitive, behavioural and emotional therapies. PTSD scores were captured at three time points of signing up, pre-interventions and post intervention completion. A total of 98 participants completed at least one full intervention. Results showed that the technology-enabled intervention was effective at reducing overall PTSD symptoms and at a PTSD cluster level.

Taking into account the results of previous studies conducted as a part of this PhD, CPT and CPT were the interventions chosen to be created in a digital format. With elements of psychoeducation and signposting added to enhance the overall functionality of the intervention. Results provided preliminary evidence that the technology-enabled intervention was significantly effective in reducing PTSD as a whole and even at the cluster level. There were, however, insignificant changes in

PTSD scores between participants signing up and completing the pre-treatment questionnaire.

The fact that the average score of participants who only completed the initial questionnaire was 60 with a range of 44 (moderate score) to 75 (Extremely high score) indicates that the message they were shown as feedback from the initial PTSD questionnaire in relation to their PTSD score did not impact the likelihood of participants using the intervention. The fact that the participants signed up but did not take undertake the interventions can be explained by individual curiosity and natural attrition. A high number of participants signed up but did not progress to complete the initial measures. As there were four initial measures, it can be derived that it may have been too much for participants to complete before they were able to view what was offered and decided that the time it would require would not be worth it.

The results provided preliminary evidence that the overall intervention was significantly effective at reducing PTSD scores, with an average reduction in average PTSD scores from 59.5 (considered to be a high PCL-5 score) at sign up to 37.4 (considered to be a low to moderate score) post intervention. The results do show an insignificant increase in PTSD score of .77 points between sign up and starting an intervention set. This insignificant increase in score can be accounted for by natural variances in emotion and thoughts on the day that either questionnaire was taken.

The results based on cluster wise PTSD symptom scores provide overall preliminary evidence that the intervention was effective at reducing PTSD scores at a cluster level across all clusters. The results on a cluster level also show that in some cases there was a slight insignificant increase or decrease in score between signing up and starting an intervention. However, as all of these differences in

PTSD scores between these two time periods were found to be statistically insignificant, the difference can be attributed to be natural fluctuations in individuals' everyday feelings, thoughts and perceptions.

As mentioned in section 1.5.2, the effectiveness of CT and CPT in reducing scores across all clusters that make up the PTSD diagnosis. This reduction was reflected in this study whereby there was a significant decrease in cluster level scores between sign up/pre-interventions and post-intervention. The results are also in line with previous research into the effectiveness of CPT and CCBT with military personnel and with research into the effectiveness of technology as a platform and intervention to deliver psychological interventions for PTSD. While CCBT has been shown to be effective in military veterans and in the general population, CPT has not been created and trialled as a technology driven intervention. The combination of these two, with the other four components that make up this intervention has been found to be effective in reducing PTSD symptoms in UK military veterans. However, it must be noted that there was a high rate of attrition throughout the study with only 98 out of 799 participants who signed going on to complete a minimum of an entire interventions set.

There were a number of limitations specific to this study. Firstly, even though participants were instructed to complete the sessions once a week, with homework being completed ahead of the next session, there was no control or monitoring as to when either of these activities took place. Therefore, it must be assumed that the participants did not all follow the set times and instructions given. This lack of control or monitoring is also applicable as a limitation to the inclusion of participants who may have not been in the UK Armed Forces as there was no validation required, therefore even if individuals did not serve in the UK Armed Forces but were from non-UK Armed Forces there was no good way to validate this. This also extend to individual who may have self-reported as being

from a military background who do not have any association with a military. Utilizing diagnostic interviews could mitigate the limitation of using self-report questionnaires; however, given the purpose of the intervention being remotely assessable, diagnostic interviews would be beneficial for research purposes but would perhaps reduce ecological validity of the study overall as this is not possible for remote interventions such as the one developed for this PhD.

There are also limitations of relying on self-report measures that should be noted. In self-report measures it is easier for participants to give responses that are not accurate or are socially desirable (Kite & Whitley, 2016). This is especially prominent in this study, as participants will have seen the questions previously. Additionally, self-report measures are prone to extreme responding especially when responses are on a Likert scale of absolutes (Paulbus & Vazire, 2007). Therefore, scores may not be representative of participants' actual state. Related to this, participants may not be self-aware enough to answer the questions accurately, therefore the results of the self-report are not accurate (Paulbus & Vazire, 2007). This can be a particularly prominent issue with PTSD as there may not be enough self-awareness or even acknowledgement of the items on the questionnaire to provide an accurate score.

Due to time and resource constraints for conducting this research, there was limited functionality and variation of the interventions. As a result of this constraint, there was no ability to save data input at registration, data input into the intervention during the sessions, scores for some psychometrics, time and date stamps were not placed on the psychometric data that was collected, so there was no record of data which would allow in-depth analysis of participant usage and behaviours. Additionally, there were a number of functionalities and aesthetics that the researcher would have liked to have implemented which were

not possible. This is reflected in the qualitative feedback provided on the interventions collected as a part of this PhD, which is reported in chapter 6.

The implications of this study for clinical practice are numerous. Firstly, the results of this study provided preliminary evidence that CPT can be effective as a digital self-help intervention. PTSD scores lower over time with continued use. Digital self-help interventions could be more regularly utilized within everyday clinical practice. However, there was a high attrition rate between participants who signed up for the intervention and participants who completed at least one full intervention set. This indicates that while society is moving into an increasingly digital age there are many other factors which will impact if individuals will turn to digital formats for treating PTSD. The next study in this PhD sought to establish opinions of the participants who undertook the technology-enabled intervention to explore in further detail the experience of using the intervention. This will give a more complete understanding of the intervention and therefore will allow for further analysis of the intervention as a whole. This evidence, whilst exploratory, gives the researcher a good basis to complete the next stage of the MRC framework and run an RCT.

In conclusion, a longitudinal study was undertaken to examine the effectiveness of the technology-enabled intervention to treat PTSD in UK military veterans. The intervention was designed using IT techniques, psychology theory and previous research. The technology-enabled intervention was found to be effective in reducing PTSD symptoms as a whole and across all clusters in UK military veterans.

Chapter 6: Study 4 – How do Veterans Feel About the Technology-enabled Intervention? What Could be Improved?

6.1. Introduction

In order to fulfil the second step of the framework for developing complex interventions set out by MRC of evaluating an intervention, interviews with military veterans was conducted. This chapter looks at the perceptions of participants who had participated in study three regarding the technology-enabled intervention they undertook (as detailed in Chapter five). It examines the personal experiences and individual perceptions of how they experienced using the intervention and seeks to understand the thoughts and feelings of their experience. To achieve this, questions specifically focused on positives, negatives and improvements to the intervention in the future. This chapter will present the method and themes emerging from the interviews. As with Chapter four, it is important to understand the aspects that participants enjoyed to encourage increased usage and decreased attrition rates. Additionally, perception of a treatment is key to a positive outcome from treatments (Lippens & MacKenzie, 2011).

6.1.1. Aims.

In order to fulfil the aims of this PhD, it is important to review and understand what was effective and not effective in the technology-enabled intervention for PTSD. This understanding will provide a detailed assessment of the perceptions of the intervention that has been undertaken and what is the most and least effective therapeutic factors of these. In turn, the understanding gained will help to inform the enhancements that can be made to the intervention in the future to create a more effective intervention.

6.1.2. Research questions.

The following research questions were addressed:

- a) Which therapeutic factors of the treatment did participants find to be the most effective?
- b) Which therapeutic factors did participants find the least effective?
- c) Where can improvements be made?
- d) Would participants use the intervention in the future?

6.2. Method

In order to provide insightful analysis and meaningful results a wide breadth of topic areas need to be considered. To explore these topics fully, the participants needed to be asked specific questions and given the opportunity to respond in any way and in as much detail they felt appropriate. This allows for rich data to be collected and will provide an in-depth insight and understanding of the participants' thoughts and feelings. As a result of this, an open ended semi-structured interview was selected. This allows for collecting rich data in a structured and directed way.

Asynchronous online interviewing techniques have been widely used in the academic literature if the internet is used as an intervention or method for data collection (Coulson, 2013). Unlike synchronous interviews, asynchronous interviews do not require the participant and researcher to be online at the same time (Coulson, 2013). Emails or online communications are exchanged whenever is convenient for the participant to respond and generally lasts over a period of days of weeks (Coulson, 2013). This method allows easier access to participants – especially when they are in a wide variety of locations.

6.2.1. Sampling methods.

The final study (to assess the perceptions and feelings of those who used the intervention) were recruited specifically from contact details given online. Therefore, for the final study utilized opportunity sampling via digital methods.

Whereby the overall target population was identified and contacted via any available contract details to be asked to participate in the research. Participants were randomly selected by first being categorised into groups (of just registering, starting an intervention, completing a full intervention), then using excel formulas participants were randomly assigned a number between one and five. The participants that were randomly assigned the number two were contacted and invited to take part.

6.2.2. Participants.

A total of 17 participants aged between 32 and 57 were interviewed. All participants were contacted by email and invited to take part in the interview. Through participant request, personal information for the participants were deleted once communication became unnecessary.

6.2.3. Interview schedule.

A semi structured open ended interview with 10 questions was developed to ascertain participants' perceptions (positive and negative) of the technology-enabled treatment, what worked, what didn't work, their thoughts on whether they would recommend the technology-enabled intervention and what enhancements could be made. Interviews took place either over the phone (n = 12) or via email (n = 5). Questions were grouped into three sections: their perceptions of the most and least effective parts of the technology-enabled treatments (question two to five), what is felt could be improved upon (questions six to eight) and would they use the intervention if they needed to in the future (question nine). Question one related to a general overview of the intervention. The interview schedule can be seen in Appendix K.

6.2.4. Procedure.

Once recruited, participants were sent the information sheet and were asked to read it. Once they read and accepted the contents of the information sheet, they gave their informed consent to participate in the study and for the interview to be audio recorded. Participants were informed that they could withdraw at any point during the interview and within one month of the interview taking place. Names were not recorded where requested by the participants. All verbal (n = 15) interviews were under 90 minutes in length. Once the interviews were complete, verbatim transcription took place by the researcher.

If the interviews took place via email (n = 2), communications lasted between three days and two weeks. The researcher emailed the participant the information sheet and consent form prior to commencing the interview. Once these were received, the participants were then sent each question one at a time and were not sent the next question until a response was received from the participant.

6.3. Results

The participant gender ratio was 13 males and 4 females. 8 participants completed at least all sessions of an intervention set (shown in the results as participant 1, 3, 4, 8, 9, 11, 12 and 14). 7 started an intervention set (shown in the results as participant 2, 6, 7, 10, 13, 15 and 16). 2 only signed up (shown in the results as participant 5 and 17).

The analysis was broken up into two sections of experience of the technology-enabled intervention and the intervention going forwards. These two sections came out of the analysis and were based on the sections of the interview schedule. For ease of understanding, they will be presented in the two sections.

6.3.1. Experience of the technology-enabled intervention.

There were three main themes that emerged from the analysis. These were ‘no judgement or stigma’, ‘session user friendliness’ and ‘psychoeducation’. The theme of session user friendliness has three subthemes of ‘text heavy’ and ‘needs more interaction’, ‘good overall design’ and ‘needs more social interaction’.

6.3.1.1. No judgement or stigma.

Participants who completed at least one full intervention reported that it was easier to disclose specific details and write the initial account of the traumatic event as they did not feel the need to embellish or hide information. This lack of inhibition was a contributing factor to aiding in recovery. While participants understood that anything said during treatment was kept in strict confidence and was done so in a safe environment, they felt a bit of comfort knowing that they were not going to be talking to a ‘real person’. This made it easier for participants to be completely honest with themselves about the events, emotions and thoughts associated with their traumatic experience.

“I felt that I could be completely true to what I really thought, what I remembered, what I felt, how I saw things playing out even though some of these didn’t really play favourably for me, or put me in a nice light.” *[participant 4]*

“I felt that I could revel and write down details of the task that was given to us, the briefing, and what I knew I was going to have to do, the things that I was planning in my head, and the mixture of joy and disgust I felt in myself when things worked out as planned. That really helped, because once I reviewed what I had written, over time, I realised that the fact

I was pleased about the outcome – to a ‘point – played a big part in my problems.” *[participant 14]*

The above quotes from two participants who completed at least one complete intervention also highlights the struggle that exists with the fear of being judged by another person where there is a realisation that the participant felt a moral discord between job success and personal feelings of mortality. The individual experience of joy being the overriding feeling in the participant led them to fear judgement, which compounded and led to PTSD developing and also from seeking help. Once this feeling of fear in others judging the participant did not exist the recovery process could begin.

“I had previously tried traditional treatment for my, um, PTSD. But I could see the expression on the person’s face. I could see that they were shocked with what I was saying....This time, I knew that no one would be hearing what I was saying. It really allowed me to go into detail that people can’t handle. Really remember what it was like.” *[participant 11]*

“I didn’t have to hide the details of my recollections, I went into detail that I would never tell another person. At first, all I could write about was the details about injury, blood, things that aren’t really talked about. It was a mess. I couldn’t bring myself to tell another person about it until I could understand it myself.” *[participant 8]*

However, it is important to highlight that the lack of inhibition in writing the account of the traumatic experiences did not impact on the difficulty in creating

the accounts. While there were hindrances relating to the ability to tell the story to another person, it still remained “difficult to write the initial account or make enough sense of my mind to make it an easy task” *[participant 9]*.

All participants who started to complete sessions reported that they felt that there was no fear of any stigma attached to them admitting to themselves that they suffered from PTSD. This was a positive feeling reported by all participants, even those who did not complete the sessions. Participants felt that there was a lot of comfort in being unidentifiable or recognizable in person.

“I really felt comfortable with the fact that I could talk about my experiences, confront them, and really be completely in the background. I wouldn’t walk down the street and have someone recognise me from a session or from walking into or out of a location. I was able to really be myself.” *[participant 11]*

“Stigma is a funny thing, we all know that we will be painted with a label, and that’s how it will always be viewed, even years down the line. I liked being able to deal with a problem I knew I had without anyone know about it at all.” *[participant 14]*

A participant quoted above shows fear that stigma lasts for a longer period of time than the condition itself. There was concern that once they were labelled as suffering from PTSD, those around the participant would always perceive them as having a condition and therefore adjust their behaviours accordingly not allowing for normal relationships. There is the perception that as they were able to

complete treatment without others knowing that they would not be subject to this discrimination and therefore any issues resulting from suffering from PTSD “could be seen as an off day” [participant 7]. This quote, given by a participant who started but did not complete a full intervention set is prominent as it indicates that the motivation behind seeking treatment (and not just the existence of motivation) could affect if an intervention is effective or completed.

The fear of judgement and stigma also manifested itself in the worry of participants that should they be unsuccessful in completing treatment that they would be judged. Or in some cases where treatment was completed at a slower pace than was expected, there would be no expectations set on the individual and therefore would not be judged for not keeping up with what was expected. The below quotes provide evidence from a participant who completed a full intervention and a participant who did not. As can be seen, there is a difference in the approach taken. The participant who did not complete a full intervention talks about being able to hide failure as opposed to talking about keeping to everyday life without someone noticing that there was anything additional going on.

“I have never tried to find treatment for fear of not being able to complete it, from being that person that not only couldn’t handle my job, but also couldn’t hack getting dealing with the fact I couldn’t handle my job. I was right, I couldn’t do it, I wasn’t really ready. But at least I know that no one...will ever know.” [participant 10]

“Being able to go about everyday life, like nothing happened, and yet able to go home and think about what I need to do, the next steps in getting better. Knowing that I could do this, and not disappear to long periods, and getting questions about where I was and having to lie...no one would be able to talk about it, about me.” *[participant 3]*

However, there were participants who started working through the sessions but could not bring themselves to write an initial account or to think about the links between their thoughts and actions and thus were unable to complete interventions. These participants were interested in what treatment involves and what would be required of them during treatment but were not prepared for the level of disclosure and confrontation of their experiences that would be necessary.

“I sat down to create my story, to think about what I’d been through. But I couldn’t do it. I just can’t talk about it, think about it” *[participant 2]*

“It didn’t seem to matter knowing no one would hear. Making it that concrete would make it too real” *[participant 7]*

“being in my life, and trying to live every day, and then going home and dealing with what I am going through, it was tough. Then I went out and I felt like people were looking at me – like they knew what was going on. I couldn’t face it.” *[participant 16]*

6.3.1.2. Session user friendliness.

This theme relates to how the site was perceived from a functionality point of view. The three subthemes identified were that it was ‘text heavy for interventions’, that the ‘overall user interface was good’ and that ‘more social interaction is required’.

6.3.1.2.1. Text heavy for interventions need more interaction.

All participants who started sessions of either type of intervention raised issues around how interactive and engaging the actual sessions were. The perception was that the content of the sessions was less dynamic and much more difficult to engage with than the rest of the website. There were thoughts raised on how to break up text, sizing of text, displays and any place an image, video or voice over would have been more beneficial than displaying text. Those who completed all sessions of an intervention expressed the difficulty they experienced when completing the final sessions, knowing what they would be viewing.

“it was very monotonous, just reading through lots of text and then going through and writing. The information in the pages was really useful, don’t get me wrong. I just would have like it to be a little varied, perhaps a little bit of colour, or a change in the way it was delivered. Something that means that it isn’t just black and white.” *[participant 1]*

“you get into the sessions from the main pages, and you kind of think, oh they ran out of money. It was just blocks of text with the occasional diagram. When you are going through 13 or whatever the number of sessions there it becomes a lot, by the last session you’re really drained from the effort of reading.” *[participant 4]*

There were some circumstances where it was felt that it was appropriate to have a high level of text, such as instructions or basic information. However, there were also areas where it was felt that the addition of audio aspects of the intervention would have broken up the process, but this not deter them from completing interventions.

“I thought, oh, fair enough, the first one is all about giving us the information, the how, the when, the why etc. It needs to be text heavy; it gives us background. But then you realise after a few that it’s all text – I just thought a bit more effort could have been made to liven these pages up.” *[participant 9]*

“It would have even been nice to have the introduction and closing comments in a voice over, or in a box that called out the start and end of the session.” *[participant 12]*

Participant who only started and some who completed the CCBT based sessions expressed feeling the sessions were less professional than the rest of the site. There were high hopes that the sessions would be similar graphically to the home and navigation pages and participants were disappointed when it came to the diagrams as they looked like not as much thought went into them.

“You click through and follow the instructions, and think, ‘oh this is all quite professional’, if I didn’t sign the consent and read the information at the start I would not have known that it was only a PhD piece of work and in it’s trial phases. Then

you get into the actual sessions, and you start to see the early nature of development.” *[participant 8]*

“I could see that it was a basic copy and paste from Microsoft Office. That was a bit off putting. I mean the sessions were really helpful and easy to follow, and I liked that you could download and take away the homework in a document...that was useful. But for it all to be like that, just wasn’t great.”
[participant 6]

The perception of participants who did not complete the intervention was similar. They were willing to work through some pages and look past the page design for the session to an extent, but after a number of sessions, they would feel too exhausted and too tired to read through the information to then go backwards and forwards to their written pages and the screen. Participants stated that they also went to lengths of printing out the sessions to work through them.

“It was okay for around 50% of the sessions, then I started to print things out – tired from reading it off the computer screen with the glare that came through. Eventually, it was too much effort on top of the other things that I was expected to do. It might have been nice to throw some interaction in there - or a joke – or something, anything to make it lighter.”
[participant 13]

“I didn’t get past the third session. After all the reading and all the effort I put into doing the homework – it was disheartening that there seemed to be less thought put into

how these things would appear on the screen. As a first pass, it was good, I would go back – try it again, but only if it wasn't just black text!" [participant 15]

"It did just feel like a book placed on a screen. There wasn't much interactions. Even a click here for more information, or link to a video or something else. Something to break it up, to add excitement. To make it feel like it was more – or else what benefit does it have over a pen and paper?" [participant 4]

There is a general perception from the participant who did not complete the sessions that they would be willing to use it again in the future should the sessions be presented in a more varied way. However, participants did acknowledge that despite the lack of interactivity and variety, it was effective enough that they would be willing to try again in the future if enhancements are made.

6.3.1.2.2. Good overall user interface.

The general perception of participants who did not complete and did complete the intervention was that the user interface, look and feel of the overall site and transitioning between pages worked really well and felt quite professional. The interactions, images, linking to different websites was perceived as being really high quality and easy to use.

"The pages looked nice, it felt as though a lot of thought went into creating and designing, where things would sit and how the experience of it would be. I really liked that the experience of navigating through." [participant 3]

“I enjoyed going on the site, looking through everything and knowing that if I ever needed to, I had the option to come on and use the tool.” *[participant 2]*

“Nice varied colours, it looked like something I could use on a regular basis. Navigation was simple, and it was all very intuitive. Nothing I came across made me wonder what was going on and how things were happening or what I was meant to do next.” *[participant 9]*

“It was very much like any other webpage. The pages were clearly set up, I knew what I needed to do and where I needed to go for information. There was quite a logical flow to the whole thing. I think it draws you in and make you want to see what else was there.” *[participant 14]*

In contrast to the intervention sessions, the perception of the overall webpage and all aspects outside of the individual sessions were well perceived. The aversion to the intervention session content was centred around visual issues rather than content or content.

6.3.1.2.3. Social interaction.

The perception was that there was a lack of social interaction. Even though it was understood that less interaction would be possible, the desire for a higher level of interaction with other people was expressed. Participants felt that even though they knew it was internet based and no face to face time would be included, they had hoped that there would be something like a forum to allow them to share their experience of PTSD and using the technology-enabled intervention with

others in the same position in an anonymous way. The desired social interactions were also raised in relation to hoping to be able to reach out to professionals and trained individuals for further help and information.

“It was effective, and I didn’t mind using the tool. But there were times when I wanted to be able to speak to someone about some things I wasn’t sure about. Just someone who could help me out when I didn’t understand exactly what was meant in the instruction, or something that I just needed to have an example of” *[participant 3]*

“When you are talking to a machine, or at it I guess, it makes it really difficult to get into it. Read the whole thing. Even if there was a virtual face, or even a set time when someone would be online so it would not seem as odd. Something to make it seem like reading out loud had a purpose.”
[participant 1]

The above quotes highlight the fact that the participants feel that the social interaction element would aid in the usability and process of completing the sessions. The participant expressed that they felt that if individuals had easy access at certain times it would increase the effectiveness and ease of use.

“Even if there are no questions, it is comforting to think that someone is there, someone you could turn to should you really need it. Like a backup, y’know? I mean just to know, know that you aren’t alone.” *[participant 12]*

“It’s a bit about endorsement, to know for sure that there was someone who knew what they were doing supporting the treatment. It would give a level of security.” *[participant 5]*

There were views voiced on the fact that peer support, in terms of sharing the experience, that level of support from someone else going through the same thing. The participants wanted to know that someone else was going through the treatment, if it was working for someone else, or even a head up for what was coming. The fact that there were no endorsements was feedback given by a person who did nothing but register. The indication is that the participant wants to see that it does work prior to investing time in progressing through the interventions. Additionally, participants felt as though if they could see or speak to others who had completed intervention sets or individual sessions for reassurance that there was a reason to complete the session and persevere.

“It would be good to be able to connect to people who were experiencing something similar. Or doing the treatment at the same time. Just have someone to compare how I was finding it, and how they were finding it. Share tips etc.” *[participant 11]*

“Sometimes, you’re working away on your own, following all the instructions, doing your best to keep yourself motivated. Yet, there is no indication that what you are doing is correct. How brilliant would it be if you could connect to someone else, at the same stage, or having just joined?” *[participant 15]*

“I’d have liked to be able to hear from someone else that things were worth it. That they had gone through it all and came out the other end with the results that they were hoping for. A proof of success.” *[participant 17]*.

Across all participant types (registered only, did not complete and completed at least one intervention) gave feedback that it would be useful to have some level of social interaction to provide some level of support and help.

6.3.1.3. Psychoeducation.

The participants generally felt as though there was not enough information on PTSD available. Participants were hoping that they could get more of an in depth understanding of PTSD treatment options, where to access them, how to investigate these and what these involve.

“I would have like to see more information overall on what PTSD is and how I can find out what treatments are out there. How do I get in touch with someone who has all the details of what I would be expecting.” *[participant 14]*

“there was nothing in there about different treatments – I would have been interested to know what the different types are. Where are the best places to go? Is there a recommended location, treatment, length of time. What would be expected form a treatment, how effective are they” *[participant 13]*

“Where can I find information on how PTSD is treated? Where are the facilities? Are there private place? Is there someone you are connected with that would be able to provide treatment?” *[participant 10]*

Even though participants understood that this website was aiming to provide the intervention for PTSD as a standalone intervention, they were still interested in learning more about other types of treatment available and how to access these. This seemed to be a feeling that was more prominent in the participants who did not complete an intervention.

6.3.2. Intervention looking forwards.

The main themes that arose around improvements to be made to the intervention were: ‘bug fixing’, ‘session interactivity’, ‘previews’, ‘social interaction’ and ‘additional functionality’. A list of these themes and a breakdown of items within each theme is shown in Table 8. These results are not described using IPA as the analysis is not suited to the points made regarding improvements. These were either taken directly from the list given to the researcher or derived from the feedback on the perceptions of the intervention.

Table 8

Themes and Detailed Items in the Themes for Technology-enabled Intervention

<u>Improvement themes</u>	<u>Detailed items</u>
Bug fixing	• some of the links stop working after a few clicks (need to reset page) • There are a few American spellings and a few UK spellings. • Some of the links no longer work • Downloading some of the homework documents would fail
Session interactivity	• Make sessions more dynamic where possible • Add visual effects/videos/audio to break up test • Allow viewing of previous sessions • Create interactive/responsive parts in the sessions
Previews	• Before sign up and formal baseline – allow a preview of what the site is like • Show screenshots of the pages, create an introduction video to watch to give motivation to go through process of signing on
Social Interaction	• Create forum for participant interaction • Connect directly PTSD professional

<u>Improvement themes</u>	<u>Detailed items</u>
Additional functionality	• Different treatment options • More information and links to other PTSD sites • Interactivity • Family/couples treatment options or page

6.4. Discussion

There were five overall recommendations for improvements for consideration in future development of bug fixing, session interactivity, previews, social interaction and additional functionality. These results are in line with some of results from Chapter 4, section 4.3.3. While it was understood that intervention on the internet is likely to be less socially interfacing, there was still an expectation that it would be easier to reach a real person should this be needed. With the time constraints on developing the technology-enabled intervention, there were limitations on the functionality, aesthetics and user interface possible.

The participants who completed a full intervention reported that they felt as though the intervention was successful in reducing PTSD symptoms. The opinions of the intervention given by participants was that overall it is okay to use provided that there is a high level of motivation was there to complete the sessions in their entirety. There were aspects of the intervention that were seen as being more successful than others and in general the participants felt that the nature of the intervention being internet based allowed for more freedom.

In the military veteran population there is a level of high fear of the stigma attached to PTSD as a diagnosis (Miller et al., 2017). The ability to engage in effective self-help was therefore seen as being very valuable. The results show that the participants felt the benefit of being anonymous interventions and this helped with their perception of the treatment. The participants felt that they were able to detach themselves from the stigma associated with PTSD and therefore the associated negative perceptions. The other positive impression of the technology-enabled intervention is the user interface of the overall webpage.

There were a number of concerns raised by participants regarding the amount of time each session took to complete. There were additional concerns about how text heavy the sessions were and the lack of social interaction in the intervention. There were also comments made about the inconsistency of design between the sessions and the overall webpage design. Finally, there were issues raised that the baseline measures taken at sign up were too intensive and without preview it was difficult to go through all the questionnaires.

The interactivity and social interactivity aspect of the intervention raised were in line with the research outcomes of Chapter 4. This result could be explained by the differences that exist in intellectual ability, learning style, personality and achievement motivation (Busato et al., 2000) showing that these aspects have a significant impact on how effective any experience can be. However, it must be noted that research is currently being conducted to take into account modern e-learning techniques (Truong, 2016). It can also be attributed to the individual differences and preferences that exist around therapist, race, culture and setting highlighted in Chapter 1.

A number of enhancements and adjustments to the webpage were suggested by the participants or derived by the researcher from the responses given. These were combined with the specific list of improvements that was given by participants. Many participants felt that it would help the user friendliness and effectiveness of the technology-enabled intervention if sessions had been more interactive. Many of the improvements suggested fall in line with the outcomes shown in Chapter 4, section 4.3.3, where social interaction and flawless usage were key themes given for the conditions of use for a technology enabled intervention. However, it is worth noting that even though it was stated that social interaction was a key feature to use, the fact that this was lacking did not

stop the intervention from being used or being effective for those who completed entire session sets.

A brief study into the soldiers' attitudes towards technology based mental health care showed that military personnel were reasonably experienced in common technology-based interventions for mental health care (Wilson, Onorati, Mishkind, Reger & Gahm, 2008). Specifically, that the majority of participants in this study stated that they would be willing to use technology-based interventions to aid in mental health recovery (Wilson et al., 2008). A third of participants suggested that they would be comfortable only using technology as they would not like to interact in person in relation to mental health issues (Wilson et al., 2008). The results from study four of this PhD corresponds with the results presented in Wilson et al. (2008), showing that even though there were some issues with the intervention, there is an appetite to utilize technology, but research has some way to go before technology can become a mainstream option for PTSD.

The primary implication of this study for clinical research and practice is that technology-enabled interventions can be seen as being effective and participants are willing to use it. What is key to consider is the social interaction, even if it's not with a trained professional. Despite the exploratory nature of this PhD, clinical research should take into account the mode and form of delivery is a key area of interest. Therefore, mode and form of delivery, especially technology-enabled interventions should be considered heavily developing further interventions for PTSD.

In conclusion, there were a number of reasons why the intervention was used until the end and some positive perceptions of the technology-enabled intervention. However, there was a high, but expected, attrition rate. There were

a number of reasons given for this attrition. Based on the experience of the technology-enabled intervention, a number of improvements were suggested for future iterations of the intervention which will be made prior to running an RCT. Further research and enhancements should be made to increase intervention effectiveness and treatment options available.

Chapter 7: General Discussion and Conclusion

The overall aim of this thesis was to examine the effectiveness of a technology-enabled intervention set for PTSD in UK military veterans. The objectives were firstly to establish what psychological interventions were found to be effective in a scientific and replicable way. Secondly, it was to consider effective and successful interventions that military veterans have experienced. Thirdly, to create a technology-enabled intervention based on this information, test the effectiveness of the technology-enabled intervention and finally assess what factors made it effective

Specific discussion points relevant to each study was discussed in the relevant chapter. The purpose of this discussion is to tie together all the elements from the previous chapters and to discuss the overall effectiveness of the technology-enabled intervention for PTSD. This discussion will focus on the key findings, the implications of the results of the research on military personnel and their loved ones on both psychological and personal terms. This chapter will also discuss the future potential of the research and suggest wider implications to society in context of developing technology-enabled interventions for PTSD and expanding this to other mental health issues. It will also consider the methodological issues of the PhD research.

The research conducted as a part of this PhD used mixed methods design to scope, create and test a technology-enabled intervention for PTSD. In order to fulfil this, four studies were undertaken in line with the MRC framework for developing and evaluating complex interventions. Firstly, it was important to review and understand what has been effective, or not effective, in existing psychological interventions for PTSD. This helped to fulfil the aims of the PhD by providing a detailed assessment of the psychological interventions that exist for PTSD. The second study was to interview military veterans who had experienced

successful PTSD interventions and are no longer suffering from PTSD. The results from this study gave the researcher a good basis for the designing of the technology-enabled intervention used for the proceeding study and provide useful insights into the perceptions of the interventions that were resulted from the systematic search completed preceding this study. The overall results from the systematic review and initial interviews with military veterans as a collective lead to the development of an effective technology-enabled psychological intervention for PTSD to be developed. The third study was to preliminarily (feasibility) test the effectiveness of the technology-enabled intervention in reducing PTSD symptoms (based on lowering PTSD scores) that was created. The final study followed up from the third study and sought to establish detailed perceptions of the technology-enabled intervention. The outcomes of this study will feed into further developments of the technology-enabled intervention.

When analysing all of the studies conducted as a part of this PhD as a whole, it can be concluded that there are a number of different psychological interventions for treating PTSD both in military and non-military populations. However, while it has been established that these interventions are effective at reducing the symptoms of PTSD, the personal perceptions and feelings of individuals who are undertaking the interventions have not been researched. This is important to understand as it can be the differentiator between an individual participating or not participating in an intervention. This fact combined with the complexities, barriers to treatment and cost of PTSD treatment means that we need to develop a more holistic understanding of the psychological interventions for PTSD in order to further create interventions that are effective and user friendly.

The initial scoping exercise conducted prior to a systematic review being conducted highlighted that PTSD is a topic that is widely researched across the

spectrum of PTSD-related research. Within this spectrum, effectiveness of interventions, causes, comorbidity and factors surrounding PTSD are extensively researched. There is limited research into the individual perceptions of individuals who are undergoing the treatments and the researcher did not find a review of the effectiveness of individual interventions of PTSD. As yet, there were few studies that researched the use of digital technology as an intervention mode. This highlighted the complexity of using digital technology to aid in treatment for PTSD.

The systematic review conducted showed that the majority of RCTs (included in the review based on the CASP checklist and inter-rater decisions) were that of cognitive, behavioural or emotional therapies. This was reflected in the intervention experience of veterans who participated in study two (interviews with veterans regarding their experiences of existing interventions) where all participants had experience in these types of therapies. This reliance on cognitive, behavioural or emotional therapies was imitated in the technology-enabled intervention that was created by the researcher for this PhD. With limited previous published research available to help inform the design of the technology-enabled intervention, study two (interviews with veterans) became a key study to inform the design of the pages and the overall look and feel.

As stated in Chapter 5, section 5.4 the researcher ran out of time (both by constraints of a PhD timeline and time given by the IT programmer) to produce the intervention sessions in the same manner as the overall webpage. As a result, the individual sessions had a different feel to the pages preceding them. The impacts of this can be seen as a result of both chapter five and six. There was a very high attrition rate (88% when including the number of participants signing up and doing nothing else. If you only include those who started an intervention the attrition rate was 58%) for study 3. There is currently no universally accepted

cut off rate (point at which you no longer collect data) for longitudinal (data is gathered for the same subjects repeatedly over a period of time; Lavrakas, 2008) studies, specifically RCTs (Fewtrell et al., 2008). However, there is a suggestion that within RCT research less than 5% is not a cause for concern with an upper cut off rate for evidence-based medicine of and 80% attrition rate (Fewtrell et al., 2008). Studies with high attrition rates should not be discounted but should provide reasons for the attrition within the context of the study (Fewtrell et al., 2008).

The 88% attrition between number of participants signing up and the number of people completing the intervention can be explained by a number of factors. The interviews conducted in study four provides only a small insight into the reasons for this as only two participants were willing to participate in the further research. These two participants were looking specifically for endorsements or evidence that the intervention was effective, which was not possible in this research. Additionally, in order to replicate the same conditions that the technology-enabled intervention could be used (as a self-help intervention) a retention strategy (Abshire et al., 2017) was deliberately not devised and used in order to minimise attrition. This allows the research to derive more applicable real-world findings.

While a reason for the high attrition rate of 58% cannot be deduced from study three, the results of study four provides an insight into the possible reasons. The fact that the outcomes of study four are consistent with opinions stated in study two in relation to aesthetics, user friendliness and social interactivity being a key element (even if it's peer-to-peer) highlights the importance and focus that these are important considerations when developing digital interventions. The fact that the current researcher was not able to apply these to the individual sessions can provide an explanation for the high attrition rate in those who started any of the

interventions. Additionally, the webpage was optimised for Chrome means that compatibility issues with other browsers led to issues in user experience.

Across participants who did not complete a full intervention set and participated in study four, there was a general opinion of wanting more psychoeducation aspects to be a part of the intervention. While the intervention did include three pages of information, it was felt that more comprehensive details of the types of interventions and treatments available would have been beneficial. Of those who did complete an intervention, the overall PTSD score averages reduced from classifications of 'high' to classifications of 'low' to 'moderate'. These results are in line with previous research conducted on PTSD intervention research into internet and technology versions of CBT and the effectiveness of CPT as a form of psychological intervention for military personnel. Given that both forms of treatment are manualised there were less ethical issues than would have existed if these interventions were created entirely from scratch.

The results across studies three and four found evidence to support the fact that even though the aesthetics are an important feature of a digital intervention, this does not have an impact on the effectiveness of the intervention in itself. The impact is on the overall retention rates. Even participants who completed an entire intervention expressed that this was an area to be improved upon. This can be explained by user-centred design (UCD) principles in the digital world. While these principles have been around for two decades it is still only starting to be taken into account in intervention development and implementation (Lyon & Koerner, 2017). The researcher incorporated some of these design principles in the development of the intervention, however with time constraints, these were not reflected in the individual sessions.

7.1. Implications and Limitations

The current PhD provides preliminary data that a combination of digital formats for existing face-to-face manualized psychological interventions for PTSD, psychoeducation and sign-posting as a collective can be effective in reducing PTSD symptoms in UK military veterans. Furthermore, the research highlights the importance of UCD in the development of interventions, especially for any interventions that are intended to be delivered in a self-help format.

There are a number of implications of this PhD research on trauma, PTSD and mental health research. Firstly, the implications of the intervention on occupational and interpersonal issues that result from PTSD are not addressed in this PhD. Participants involved with any parts of data collection conducted as a part of this PhD did not mention the impacts of the intervention on occupational or interpersonal issues. However, given what is stated in Chapter 1 regarding the effect that PTSD has on loved ones it is an important aspect to address and gain more knowledge on. Is there a substantial impact on the ability to take part in activities with children or spouses or connect to the outside world on a more meaningful level. From a business and economical perspective, can the lost business productivity loss be addressed. Can reducing PTSD symptoms also result in a reduction of symptoms for other mental health conditions. According to research stated in the introduction, these aspects can be interlinked and therefore reducing PTSD symptoms can result in improvement across all these issues.

Based on the attrition rate that was found in study 3 and the subsequent interviews, it can be derived that more consideration for the user experience needs to be placed on reducing attrition rates for digital interventions for psychological and mental health disorders. However, a part of the attrition rate could be due to participants registering and logging in the site but subsequently

feel as though they do not have PTSD but another issue and therefore do not need to proceed with any of the available intervention choices. Inclusion of other interventions to address sub-clinical trauma, traumatic stress, or other associated issues could reduce attrition rates. Additionally, no data was collected on personality types or coping strategies. As seen in Chapter 1, personality, coping and protective factors have a large impact on predicting PTSD onset. If participants have an avoidant coping strategy, even though they may seek out and start an intervention, they are unlikely to continue this to completion.

There were a number of theoretical methods and modes used to treat PTSD which have been described in Chapter one. The focus of the interventions used in this PhD was cognitive and/or behavioural interventions. While CBT is the most widely researched form of technology-enabled therapy, it may be that other therapy forms such as exposure therapies that may be suitable for a digital mode of delivery. Mindfulness based interventions are training based, which perhaps may be more suitable to delivery in a digital format. With modern machine learning capabilities, exposure therapies such as NET could be more effective at reducing PTSD symptoms than CBT as it will take into account personality nuances and any previous information given by the participant. Related to the methods of intervention is the mode of intervention. Group formats have been found to be effective in traditional in person formats, this PhD focused on the individual mode. However, group modes of the individual therapies are often found to be equally effective as individual therapies. When considering this fact in combination with participants feedback regarding social support, digitally enabled group therapy could be an effective and should be further researched.

The implication on in person interventions is that digital interventions or digital support/supplements to their therapy to help to enhance experiences and provide additional support between sessions. These digital mechanisms can also

aid the clinical practitioner in recording progress made and times of high or low symptoms if used well. As a result, the participant profile available for the clinical practitioner could provide greater knowledge and therefore inform approach or talking points for future sessions.

There are further implications of the shift into a digitally reliant society on clinical practice and research. The numbers of participants that signed up to the intervention was relatively high for the amount of advertising that was done, and therefore does provide evidence to support the need for more mental health interventions to be available digitally. It also starts to provide evidence that society as a whole have started to become more open to the possibility that use of the internet for mental health questions and issues (mirroring this shift in the medical profession; Silver, 2015). It is important to consider the ethical and professional responsibilities researchers and practitioners have as a result of this shift. The locus of responsibility and ethical considerations shift when considering self-help interventions. In creating and releasing more and more digital self-help alternatives for PTSD treatment, more care and consideration needs to be taken during the development and assessment phases to ensure that no additional harm (psychological or physical) is done to participants and users of the interventions.

One of the main limitations of this PhD as a whole was the method of sampling or recruitment of participants. Opportunity, volunteering and internet sampling methods were used to recruit participants across the UK across all studies. In addition, contacts from the researcher's previous research directed participants to the technology-enabled intervention once it was available. Opportunity, volunteer and internet sampling methods all can result in bias either in location (Field, 2013) and internet sampling can lead to a non-representative sample as a result of the characteristics of Internet access and use (Krantz & Dalal, 2000).

Even though efforts were made to recruit from a diverse range of individuals with varied military and post-military experiences it is evident from the participant information that was collected that the diversity across the military was not as varied as is ideal. Reliance on personal contacts and word of mouth, as well as on social media means that individuals who are already reasonably technology literate would find the intervention. This creates a limited sub-sample of individuals which places a constraint on how far the research can be generalised.

All research was based on self-report measure or interviews focused on individual perceptions and feelings of a construct. As a result of this focus, the outcomes of this thesis are heavily reliant on the accuracy of the memories of participants and honesty in responses, which is complied with the risk that detecting deception is more difficult when using online surveys (Mendelson, 2013). There may be positive impression management throughout the research, especially considering what has been reported around the stigma of PTSD. In addition to this, DSM-5 had only just been released at the time this research began and the self-report measure of PTSD that was selected was the only validated self-report against the new DSM at the time it was required from programming. This gave the researcher limited choice in questionnaire to utilize in the research and the PCL-5 was not validated against military veteran populations as its predecessor was. The measures used were also validated in America, which means that it may not have the same standard validity and reliability in the UK.

Using IPA as a method of analysis has a number of methodological constraints and issues. IPA in its nature and approach means that it is highly based on not only how an individual sees the world but also how that person expresses themselves using language (Willig, 2008). So one person's use and expression of the word 'great' could be equivalent to another person using the word 'good' or

‘fantastic’. This method allows much more leeway for a participant to go off topic and in the transcribing process, capturing nonverbal cues is not within the process (Willig, 2008).

Future research into digitally enabled interventions for PTSD should be conducted to understand the wider implications of these on society and mental health care. It would be interesting to examine the effectiveness of the intervention on different subsets of populations suffering from PTSD. As has been indicated in previous chapters, military personnel experience PTSD in a different way if the PTSD is a result of their military service. In addition to different subsets of PTSD, it would also be beneficial to research the effectiveness of this intervention across different ethnic groups. As indicated in the introduction culture, ethnicity and race also have an impact on intervention effectiveness.

With the increase in mobile and wearable technology in recent years (Cognizant, 2017), it would be beneficial to develop and test mobile device friendly pages and apps. Additional functionality in the intervention, including interactive elements, additional treatment options and more information across psychoeducation should be developed and researched. Due to time constraints, it was not possible to develop additional measurement throughout the intervention, this would allow a better understanding of the pattern of symptom severity across treatment. The ability of the intervention to record more detailed data across the sessions would allow a richer analysis on the effect and use of the intervention.

More research is currently being conducted into learning styles in relation to new e-learning and technology enable training and personal development. Once this research has begun to be publish, it will be prudent to take the outcomes into account when developing the intervention further.

The PhD provided evidence that the technology-enabled intervention is effective at reducing PTSD symptomology in British military veterans. This can be used as a basis for future development and enhancements, as well as developing different subsets of interventions across different cultures, PTSD types and further to other mental health issues. Whilst the research highlighted the importance of the complexity of PTSD, individual differences and motivation when attempting to complete self-help interventions over a long period of time.

There seems to be a lack of research into how PTSD interventions are experienced by an individual. This is understandable as it is the effectiveness of the interventions and reduction of PTSD symptomology that are of key concern. However, evidence from this thesis highlights the importance of how participant experience an intervention. This is important, as research shows that if PTSD is left untreated and the symptoms do not dissipate without treatment, long term effects are more severe (Wilson, Friedman, Lindy, 2004). If the experience as an overall is perceived in a more positive light and issues felt by individuals undertaking the interventions is understood and If the experience as an overall is perceived in a more positive light and issues felt by individuals undertaking the interventions is understood and we can encourage individuals to seek help earlier.

7.2. Conclusion

To conclude, this thesis has documented the effective individual treatments for PTSD. It has established the perceptions of psychological interventions for PTSD in military veterans who no longer suffer from PTSD on a daily basis. It has developed and tested a technology-enabled intervention for PTSD to treat PTSD in military veterans and established the perceptions of this intervention from individuals who experienced the intervention (either in its entirety or in parts). As a result of the intervention, PTSD scores in those who completed an intervention

reduced and positive comments were made in the interviews regarding the intervention. A number of important factors which were key to successful PTSD intervention were established and factors which would impact if participants would use a technology-enabled intervention were reported. Individuals did not fall into the category of experiencing high levels of PTSD symptoms, who also completed all sessions of an intervention found the interventions to be effective, however would have liked a more visually pleasing and interactive experience. However, the fact that the interventions lacked these things did not stop a number of participants from completing and benefiting from the intervention, but it did hinder many participants after a number of sessions. Further research into developing technology-enabled interventions for PTSD should be conducted.

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Appendices

Appendix A – Interview schedule for veterans' perceptions of existing interventions

Veterans Perceptions and Experiences of Psychological Treatments for Traumatic Stress/PTSD

Semi-structured Interview – Interviewer

Check it is ok to record

My name is Layla, and I am a PhD research student at the University of Nottingham. Today, I'm here to find out more about your experiences with psychological treatments that you have received for traumatic stress. I'm really interested in hearing what you have to say on this issue. I may take some notes throughout the interview.

To begin with, I was wondering if you would tell me a little more about yourself.

SES checklist (personal use)

Marital Status	
Number of Children	
Current Occupation	
Previous armed forces division	
Tell more about the experience that caused your traumatic stress/PTSD	
Can you tell me more specifically about your symptoms	
Are there any key aspects that you felt would have helped you manage your traumatic stress at the time?	

How about outside of a work setting? Is there anything you felt would have helped?	
---	--

Thank you. So now we'll talk more about your experiences with treatments. If you haven't experienced any treatments please go directly to question 15.

1	Will you please tell me which treatments you have received?	
We will now discuss each treatment and your thoughts on it at the time:		
2	How long did you undertake treatment for?	
3	For you, what was the process of the treatments? (what you remember)	
4	How did you feel during this? Both your opinion of the process, and the aspects of the intervention.	
5	What did you think was the most effective part of the treatment, and why?	
6	What did you think was the least effective part, and why?	
7	What would you change about this?	
8	Overall did you feel that it was effective?	
9	How do you feel about it now in comparison to then?	
10	Is there anything you would like to add in relation to this treatment?	
We will now discuss treatments or processes you feel are missing, you would like to see, or that you feel would have helped you to manage and cope better.		
11	What would you like to have seen more of during the time you were undergoing treatment?	
12	Is there anything you feel could have helped you at the time?	

13	Are there any key areas of your experiences that you feel you could have had more support with	
14	Is there anything you feel could have been added to make the treatment more effective or user friendly	
We'll now move onto the final part of the interview		
15	If you were provided with computer options for treatment that you could access anywhere would you use it? Would it have helped?	
16	If so, what do you think the key features of this should be and what would you like to see from this? If not, why not?	
17	Is there anything you would like to add?	

Thank you. (Ask for feedback of the process).

(List treatments mentioned in item 1)

Appendix B – Ethical Approval Letter



Direct line/e-mail
+44 (0) 115 8232561
Louise.Sabir@nottingham.ac.uk

6th May 2014

Layla Ho
PhD Student
c/o Dr Nigel Hunt
Associate Professor
Psychiatry and Applied Psychology
School of Medicine
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Faculty of Medicine and Health
Sciences

Research Ethics Committee
c/o School of Medicine Education Centre
8 Floor, Medical School
Queen's Medical Centre Campus
Nottingham University Hospitals
Nottingham
NG7 2UH

Dear Layla

Ethics Reference No: E16012014 SoM PAPsych
Study Title: Developing a computer based intervention for PTSD
Lead Investigator/Student: Layla Ho, PhD student in Applied Psychology, Division of Psychiatry & Applied Psychology, School of Medicine
Chief Investigators/supervisor: Dr Nigel Hunt, Division of Psychiatry & Applied Psychology, School of Medicine
Duration of Study: 05/2014-08/2016 27 mths **No of Subjects** 245

Thank you for responding to the issues raised by the Committee and the following revised documents were received:

Study 1: Perceived Effectiveness of Psychological Treatments and what is missing?

- INT.INTVW.1, Protocol, final version 1.0, 4th February 2014
- INT.INTVW.1, Consent Form, Final Version 1.0: 04/02/2014
- INT.INTVW.1, Participant Information sheet final version 1.0: 04/02/2014

Study 2: Draft Intervention Veteran Evaluation

- DFT.INT/INTVW.VRN, Protocol Final version 1.0, 4th February 2014
- DFT.INT/INTVW.VRN, Participant Information Sheet, Final version 1.0 date 04/02/2014
- DFT.INT/INTVW.VRN, Consent Form, Final version 1.0: 04/02/2014

Study 3: Draft Intervention Professional Evaluation

- DFT.INT.INTVW.PROF, Protocol Final version 1.0 4th February 2014
- DFT.INT.INTVW.PROF, Participant Information Sheet, Final version 1.0, date 04/02/2014
- DFT.INT.INTVW.PROF, Consent Form, Final version 1.0: 04/02/2014

Study 4: Controlled Trial for the computerized intervention

- CT-CI, Protocol, Final version 1.0, 04/02/2014
- CT-CI, Participant Information Sheet, Final version 1.0, date 04/02/2014
- CT-CI, Consent Form, Final version 1.0: 04/02/2014

- Letter requesting more detailed information about the of proposed project from Combat Stress dated 9th January 2014.

Documents previously received:

- Research Ethics Checklist parts I-V dated 9.12.2013
- Developing a computer based intervention for PTSD, Research Proposal version 1.0, Date: 31.11.13

- Veterans Perceptions and Experiences of Psychological Treatments for Traumatic Stress/PTSD Interview Schedule and questions version 1.0, 31.11.13
- Veterans Perceptions and Experiences of Psychological Treatments for Traumatic Stress/PTSD, Semi-structured Interview- Interviewer schedule version 1.0, 31.11.2013.

These have been reviewed and are satisfactory and the study is approved.

Approval is given on the understanding that the Conditions of Approval set out below are followed.

1. A letter of support from Combat stress is submitted when this is available.
2. Copies and details of recruitment posters/adverts are submitted when these have been agreed and approved by Combat Stress.
3. A copy of the "Draft Intervention for Evaluation" for both veterans and Professionals is submitted when this has been developed and has been approved by Combat Stress for review please.
4. A copy/web link of the proposed Computerised intervention is submitted when this is available and has been approved by Combat Stress for review please.
5. You must follow the protocol agreed and inform the Committee of any changes using a notification of amendment form (please request a form).
6. You must notify the Chair of any serious or unexpected event.
7. This study is approved for the period of active recruitment requested. The Committee also provides a further 5 year approval for any necessary work to be performed on the study which may arise in the process of publication and peer review.
8. An End of Project Progress Report is completed and returned when the study has finished (Please request a form).

Yours sincerely



Dr Clodagh Dugdale
Chair, Nottingham University Medical School Research Ethics Committee

Appendix C – Participant Information Sheet Example



The University of
Nottingham

School of Medicine
Department of Applied Psychology and Psychiatry
Participant Information Sheet
Final version 1.0: 04/02/2014)

Title of Study: Perceived Effectiveness of Psychological treatments and what is missing
Study ID – INT.INTVW.1

Name of Researcher(s): Layla Ho

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. One of our team will go through the information sheet with you and answer any questions you have. Talk to others about the study if you wish. Ask us if there is anything that is not clear.

What is the purpose of the study?

This study seeks to find out and understand more about your experience of non-medical interventions that you have undergone for treating PTSD.

Why have I been invited?

You are being invited to take part because you have in the past suffered from PTSD and are now reporting no further symptoms. We are inviting 15 participants like you to take part.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. This would not affect your legal rights.

What will happen to me if I take part?

The one-off interview will take approximately an hour to complete. You will be asked a series of questions around your perceptions of the treatments that you have undergone and what you feel would be beneficial in addition to these.

Expenses and inconvenience allowance

Participants will not be paid to participate in the study.

What are the possible disadvantages and risks of taking part?

You will be asked questions that may bring back unpleasant memories of the causes of your traumatic stress.

What are the possible benefits of taking part?

The information we get from your participation in this study will help in the design of a non-medicinal computer intervention for PTSD.

What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak to the researchers who will do their best to answer your questions. The researchers contact details are given at the end of this information sheet. If you remain unhappy and wish to complain formally, you should then contact the Ethics Committee Secretary, Mrs Louise Sabir, Division of Therapeutics and Molecular Medicine, D Floor, South Block, Queen's Medical Centre, Nottingham, NG7 2UH. E-mail louise.sabir@nottingham.ac.uk.

Will my taking part in the study be kept confidential?

We will follow ethical and legal practice and all information about you will be handled in confidence.

If you join the study, some parts of the data collected for the study will be looked at by authorised persons from the University of Nottingham who are organising the research. They may also be looked at by authorised people to check that the study is being carried out correctly. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty. Your responses may be used in quotes in an academic article, however your identity will be kept confidential.

All information which is collected about you during the course of the research will be kept **strictly confidential**, stored in a secure and locked office, and/or on a password protected database and on a password protected computer. Any information about you which leaves the institution will have your name and address removed (anonymised) and a unique code will be used so that you cannot be recognised from it.

Your personal data will be kept after the end of the study so that we are able to contact you about the findings of the study and possible follow-up studies (unless you advise us that you do not wish to be contacted). All other data will be kept securely for 7 years. After this time your data will be disposed of securely. During this time all precautions will be taken by all those involved to maintain your confidentiality, only members of the research team will have access to your personal data.

What will happen if I don't want to carry on with the study?

Your participation is voluntary and you are free to withdraw at any time up to publication, without giving any reason. If you wish to do so, please contact the researcher directly.

Who is organising and funding the research?

This research is being organised by the University of Nottingham and is being funded by the Economic and Social Research Council

Who has reviewed the study?

All research in the University of Nottingham is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by School of Medicine Research Ethics Committee.

Further information and contact details

Researcher Details – Layla Ho; contact number TBC; Lwxlh9@nottingham.ac.uk

Supervisor Details – ~~Dr~~ Nigel Hunt; nigel.hunt@nottingham.ac.uk

Appendix D – Consent Form Example



CONSENT FORM Final version 1.0: 04/02/2014

Title of Study: Perceived Effectiveness of Psychological treatments and what is missing

REC ref: *(to be added after approval given)*

Name of Researcher: Layla Ho

Name of Participant:

Please initial box

1. I confirm that I have read and understand the information sheet version number **1.0** dated **04/02/2014** for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐
3. I understand that relevant sections of my data collected in the study may be looked at by the research group and regulatory authorities where it is relevant to my taking part in this study. I give permission for these individuals to have access to these records and to collect, store, analyse and publish information obtained from my participation in this study. I understand that my personal details will be kept confidential. ☐
4. I understand that the interview will be recorded and that anonymous direct quotes from the interview may be used in the study reports. ☐
5. I understand that information about me recorded during the study will be kept in a secure database. If the data is transferred it will be made anonymous. Data will be kept for 7 years after the study has ended. ☐
6. I agree to take part in the above study. ☐

Name of Participant

Date

Signature

Name of Person taking consent

Date

Signature

2 copies: 1 for participant, 1 for the project notes.

Appendix E – Data Extraction for Systematic Review

Author Year	Sample size	Age	Sex	Ethnicity	Details of traumatic event	Randomisation method	Type of psychological intervention	Nature of control condition	Duration	Results
Basoglu 2007	31	18-65	F: 27 M: 4	Turkish	earthquake survivors	computer- generated sequence of random numbers that ensured equal cell sizes and did not lead to allocation of more than two consecutive cases to the same experimental condition	n = 16 a single session of exposure to simulated tremors in an earthquake simulator and self-exposure instructions	n = 15 waiting list	- single session in earthquake simulator (9-70 min self- administered earthquake simulation, mean=33min) - treatment group: assessments at baseline and 4, 8, 12 and 24 weeks post- treatment - no treatment: assessment at baseline and at weeks 4 and 8 post- treatment	- treatment effects at week 8 were significant on measures of fear, PTSD and self- and assessor-rated global improvement - improvement rates were 40% at week 4, 72% at week 12, 80% at week 24, and 80% at 1–2-years' follow-up, with large effect sizes on fear and PTSD measures - post-session reduction in fear of earthquakes and increased sense of control over fear at follow-up related to improvement in PTSD
Ehlers 2014	121	18-65	F: 71 M: 50	London and Oxford, UK: 85 Caucasian	interperson al violence, accidents/dis aster, death/harm to others,	allocation to groups by computerised minimization procedure, to stratify for sex	n = 30 Intensive Cognitive Therapy n = 31	n = 30 Waiting List	- up to 20h of treatment by the 14-week posttreatment/w ait assessment; sessions spread	- at posttreatment/wait assessment, 73% of the intensive cognitive therapy group, 77% of the standard cognitive

Appendix F – Data extraction from manuals Example

A-B-C Sheet

Session ____

Date:		
Activating event A "Something Happens"	Belief B "I tell myself something"	Consequence C "I feel something"
I shot a Vietnamese woman while in combat.	I am a bad person because I killed a helpless civilian	I feel guilty and angry with myself.
Are my thoughts above in B realistic? No. One mistake does not make me a bad person. People make mistakes, and high stress situations, like combat zones, increase the probability of such mistakes		
What can you tell yourself on such occasions in the future? I may have made mistakes in my life, but that does not make me a bad person. I may have done things that I regret, but I have also done good things in my life		
Date:		
Activating event A "Something Happens"	Belief B "I tell myself something"	Consequence C "I feel something"
Are my thoughts above in B realistic? 		
What can you tell yourself on such occasions in the future? 		

Appendix G – Calculation for psychometrics for Programmer Example

All scores (for each question and the final score) need to be saved!
Need to be able to pull down all the scores for all the questionnaires (as an admin person)
Can we name the questionnaires the title I have given it without the brackets?
Needs to be programmed so that they cannot click complete/next without answering all the questions.
You have completed this section page: "Thank you. You have now completed this section"

This colour is something that is for your info but does not need to be shown on the screen

<u>Screen 1 (Information)</u>															
Just text.							<u>Scoring (back end working)</u>								
"This section will be used to get a general overview of the symptoms you are experiencing. There are a total of 20 questions and there is no right or wrong answer. Please answer all questions in the order they are presented. Please answer all questions honestly, generally your first response is the most representative."							Method 1 (for feedback)								
<u>Screen 2 (The questions)</u>							The total score is just a sum of the numbers in the "for scoring" row								
Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then select one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.							Categories:								
Q1	In the past month, how much were you bothered by:						Low prominence (this is the score that is up to 20 points)								
	Repeated, disturbing, and unwanted memories of the stressful experience?						Medium prominence (this is the score that is 20-59 points)								
Response options	Not at all	A little bit	Moderately	Quite a bit	Extremely		High prominence (this is the score that is 60+ points)								
For scoring	0	1	2	3	4		Method 2 (do not feedback)								
Q2	Repeated, disturbing dreams of the stressful experience?						Cluster B Total: Sum of questions 1-5								
Response options	Not at all	A little bit	Moderately	Quite a bit	Extremely		Cluster C Total: Sum of 6&7								
For scoring	0	1	2	3	4		Cluster D total: Sum of 8-14								
Q3	Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?						Cluster E total: Sum of 15-20								
Response options	Not at all	A little bit	Moderately	Quite a bit	Extremely										
For scoring	0	1	2	3	4										
Q4	Feeling very upset when something reminded you of the stressful experience?														
Response options	Not at all	A little bit	Moderately	Quite a bit	Extremely										
For scoring	0	1	2	3	4										
Q5	Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?														
Response options	Not at all	A little bit	Moderately	Quite a bit	Extremely										
For scoring	0	1	2	3	4										

Screen 3 (Thefeedback)

Depending on the total score display one of:

If Low prominence

“Based on your responses, you seem to experience low levels of PTSD symptoms. This means that overall, you do not experience high levels of disruption to your life as a result of your experiences. Please feel free to use the tools and sessions that are available here to help you to better understand and manage your symptoms.”

If medium prominence

“Based on your responses, you seem to experience medium levels of PTSD symptoms. This means that overall, you experience a considerable level of disruption to your life as a result of your experiences. Please feel free to use the tools and sessions that are available here to help you to better understand and manage your symptoms.”

If high prominence

“Based on your responses, you seem to experience high levels of PTSD symptoms . This means that overall, you experience high levels of disruption to your life as a result of your experiences. It is highly recommended that you seek further professional help. However, do feel free to use the tools and sessions that are available here.”

Appendix H – Example of instructions for landing page

Landing Page – Access Professionals

NOTE FOR ROSH - This is just the text for the landing page for access professionals. It can appear as it is.

When considering professional help, there are a number of key things to consider. If you have any further questions feel free to [contact us](#) or charities working in the area.

1. Qualifications.

You are looking for someone with a medical/psychology degree or professional certification, ideally with further certificates in areas around counselling/therapy.

The exact professional level certifications will depend on the country you are living in and type of treatment you are looking for. Generally, it is advised that you look to registering and regulating bodies.

If in doubt, there are a number of places to look and ask for advice/information.

2. Professional Experience.

You want to try to find a mental health professional with experience in treating trauma, and if possible also with specific experience treating PTSD. A good start could be to contact your GP for a confidential discussion.

Another thing to consider is the traumatic event that you experienced. If possible, a professional with a history of focus on traumatic events caused by the type of traumatic event you experienced would also be beneficial.

3. Compatibility.

You will be speaking to your mental health professional about private and distressing events. You should feel comfortable doing so and feel as though you can trust this person, or this will hinder your improvement.

You may want to speak with others on [forums](#) or who have been through similar experiences and get recommendations or even [your](#) GP.

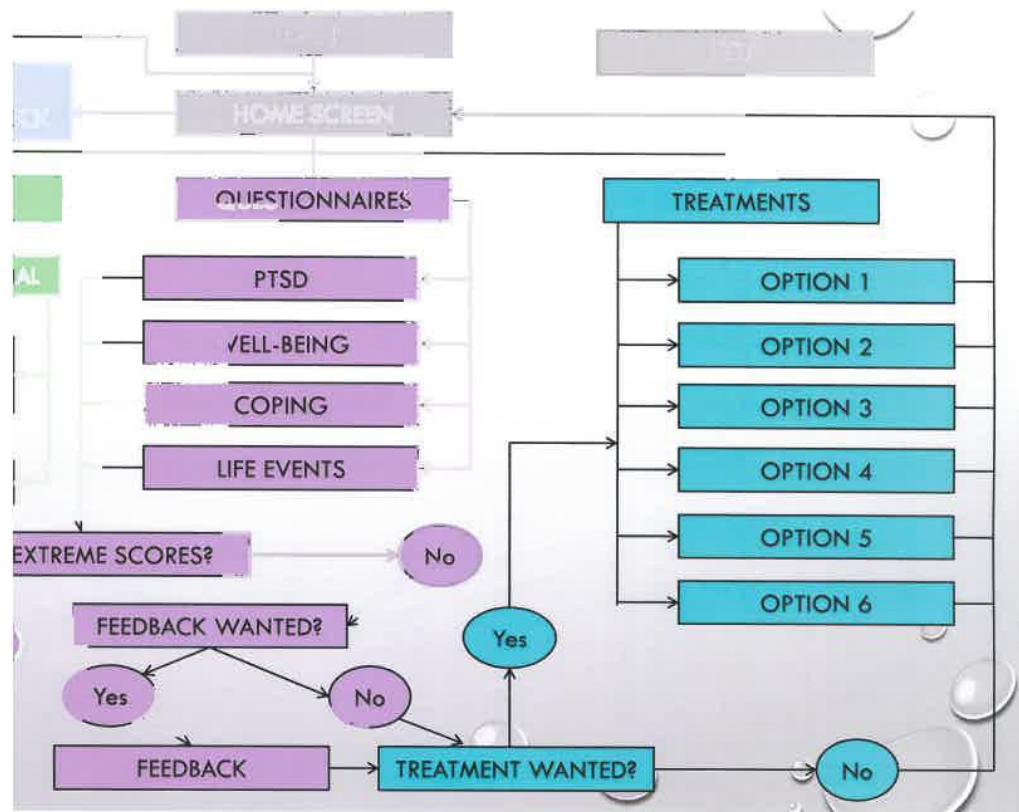


Layla Ho
Link to "Contact Us"

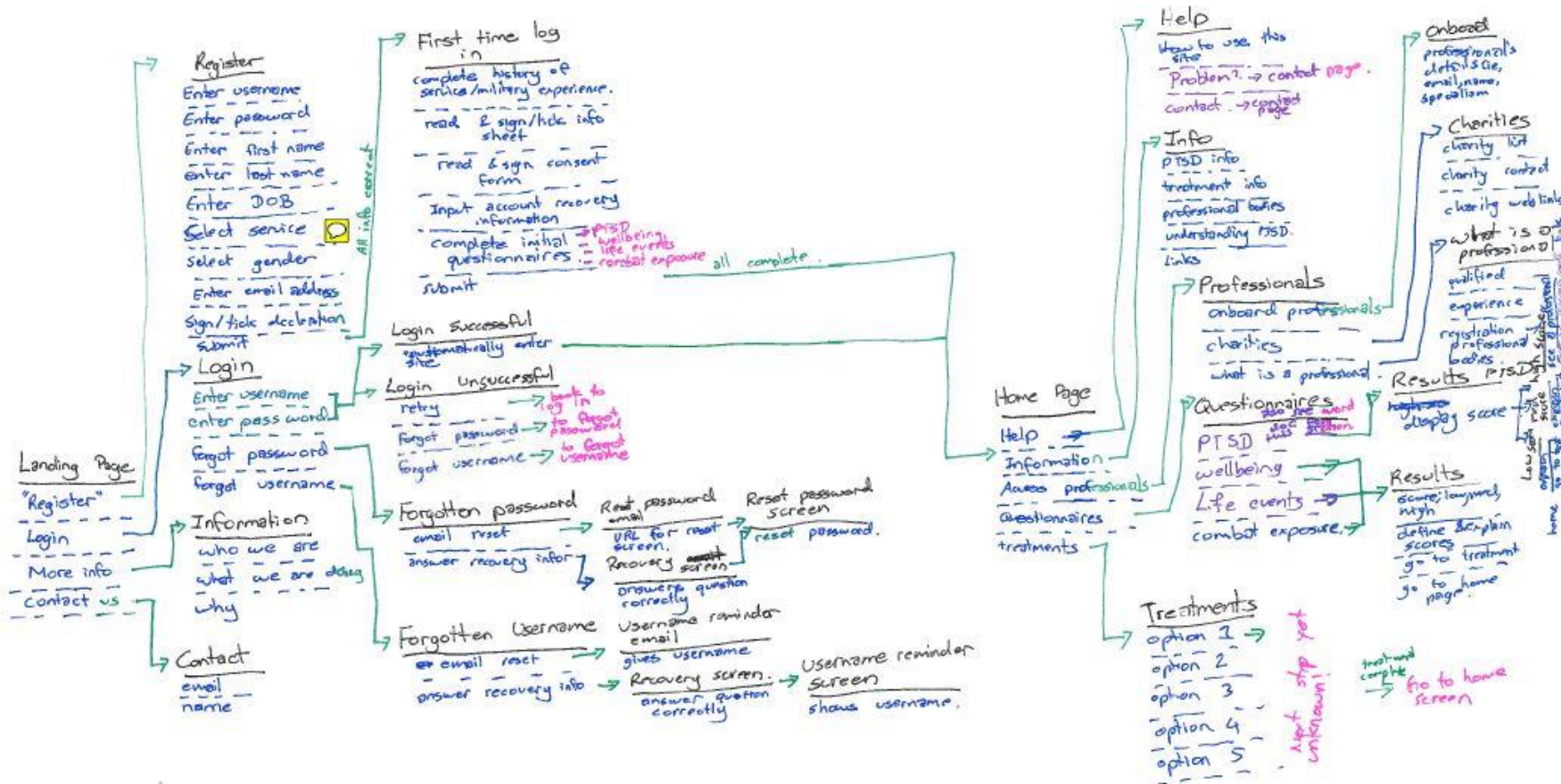


Layla Ho
Can this link to "Forums" section in the "Info" page

Appendix I – User Flow example



Appendix J – User Flow



Appendix K – Interview Schedule for Study 4

Veteran Perceptions of the intervention¶

Check it is ok to record¶

My name is Layla, and I am a PhD research student at the University of Nottingham. Today, I'm here to find out your opinion of the intervention that you have been reviewing. I'm really interested in hearing what you have to say on this issue. I may take some notes throughout the interview.¶

To begin with, I was wondering if you would tell me a little more about yourself.¶

SES checklist (personal use)¶

Marital Status¶	¶	¶
Number of Children¶	¶	¶
Current Occupation¶	¶	¶
Previous armed forces division¶	¶	¶
Tell more about the experience that caused your traumatic stress/PTSD¶	¶	¶
Can you tell me briefly about the treatment you received for this?¶	¶	¶

¶

Thank you. So now we'll talk more about your perceptions of the intervention.¶

1¶	What is your general opinion of the intervention that you reviewed? Any positives, negatives?¶	¶	¶
We will now discuss each section in turn.¶			
2¶	Can you tell me what your opinion of this particular section is?¶	¶	¶
3¶	What would you say are the positives?¶	¶	¶
4¶	What would you say are the negatives?¶	¶	¶
5¶	Do you feel that this would be beneficial to those who would use it?¶	¶	¶
We will now talk about some general questions.¶			
6¶	What changes would you make?¶	¶	¶
7¶	Are there any general improvements you feel would improve your experience?¶	¶	¶
8¶	Is there anything you would like to see (formatting, presentation etc)?¶	¶	¶
9¶	Would you use this intervention?¶	¶	¶
10¶	Is there anything you would like to add?¶	¶	¶

Thank you. (Ask for feedback of the process).¶

(List treatments mentioned in item 1)¶

Appendix L – CASP example

Section A: Are the results of the trial valid?

1. Did the trial address a clearly focused issue?

Yes ☒ HINT: An issue can be 'focused' in terms of

Can't Tell ☐

No ☐

- the population studied
- the intervention given
- the comparator given
- the outcomes considered

Comments: 1 intervention, for PTSD, specific population

2. Was the assignment of patients to treatments randomised?

Yes ☒ HINT: Consider

Can't Tell ☐

No ☐

- how this was carried out
- was the allocation sequence concealed from researchers and patients

Comments: via a true randomization process (www.random.org), generated by an independent person

3. Were all of the patients who entered the trial properly accounted for at its conclusion?

Yes ☒ HINT: Consider

Can't Tell ☐

No ☐

- was the trial stopped early
- were patients analysed in the groups to which they were randomised

Comments: detailed listing of withdrawals

Is it worth continuing?

4. Were patients, health workers and study personnel 'blind' to treatment?

Yes ☐

Can't Tell ☐

No ☒

Comments:

5. Were the groups similar at the start of the trial?

Yes ☒ HINT: Consider

Can't Tell ☐

No ☐

- other factors that might affect the outcome, such as; age, sex, social class

Comments:

6. Aside from the experimental intervention, were the groups treated equally?

Yes ☒

Can't Tell ☐

No ☐

Comments: In so far as the treatment or not randomisation they all recieved the same treatment and also the same pre & post processes

Section B: What are the results?

7. How large was the treatment effect?

- HINT: Consider
- what outcomes were measured
 - Is the primary outcome clearly specified
 - what results were found for each outcome

Comments: w2 analyses indicated a significant difference between groups at posttreatment for remission on the PCL ($w2$ 5.5.2, P 0.01), with remission rates maintained in the Treatment group at follow-up. At 3-month followup, 14/23 (61%) of Treatment group participants no longer met diagnostic criteria for PTSD (Table 4), 52% no longer met diagnostic criteria for any of the six disorders, and the mean number of comorbid diagnoses reduced from 1.9 (SD 5.1.3) to 0.8 (SD 5.1.2).

8. How precise was the estimate of the treatment effect?

- HINT: Consider
- what are the confidence limits

Comments: fairly precise

Section C: Will the results help locally?

9. Can the results be applied to the local population, or in your context?

Yes	☒
Can't Tell	☐
No	☐

- HINT: Consider whether
- the patients covered by the trial are similar enough to the patients to whom you will apply this
 - how they differ

Comments: In the local population - but considering the limitations of the exclusion criteria - i.e. that there were comorbid conditions

10. Were all clinically important outcomes considered?

Yes	☒
Can't Tell	☐
No	☐

- HINT: Consider whether
- there is other information you would like to have seen
 - if not, does this affect the decision

Comments:

11. Are the benefits worth the harms and costs?

Yes	☒
Can't Tell	☐
No	☐

- HINT: Consider
- even if this is not addressed by the trial, what do **you** think?

Comments: A univariate ANCOVA on posttreatment PCL-C scores (Table 3), controlling pretreatment scores, revealed that the Treatment group had significantly lower posttreatment scores than the Control group (F 1,39 5.5.03, P 0.03). A paired samples t-test for the Treatment group revealed no change in PCL-C scores between posttreatment and follow-up (t 22 5.0.27, P 5.79). Posttreatment outcome was not predicted by pretreatment trauma severity (r 5.25, P 5.11) or the number of additional comorbid diagnoses (r 5.86, P 5.86).