

**Exploration of a Pre-Deployment
Health Intervention in the British
Military:
A Mixed Methods Research Approach**

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Abstract

Introduction: In an increasingly volatile and unpredictable world, safeguarding the health of British military personnel so they can protect the security of the UK, and our allies has never been more critical. British military personnel are often deployed to austere environments around the world with a heightened risk of Disease Non-Battle Injury (DNBI). DNBI not only has detrimental effects on individual health but also reduces the unit workforce, impairing a commander's ability to achieve mission objectives. Pre-deployment health briefs aim to equip military personnel with the knowledge needed to adopt good health practices whilst overseas. This research investigates the effectiveness of the health brief in influencing behaviour change, focusing on attitudes towards the health brief, its delivery, risk-taking tendencies and illness prevalence within this cohort.

Methods: A Mixed Methods Research (MMR) Explanatory Sequential design was employed, combining quantitative data using a cross-sectional survey (n=295) and qualitative data using three focus groups (6 military personnel in each) conducted with three British infantry units who returned from six-month operational tours in Iraq (code name: Operation SHADER). The findings from the studies were analysed separately and integrated using an explanatory sequential analysis approach.

Results: The findings reveal critical limitations in the health brief's efficacy. While 76.9% of participants acknowledged the necessity of health briefs, only 37.3% reported adopting a behavioural change as a result of the intervention. Focus group participants criticised the brief for its lack of specificity and utility, reinforcing the quantitative finding that much of the advice was perceived as "common sense". Although 92% of participants believed they knew how to protect themselves from illness or injury, this awareness appeared to stem from prior knowledge rather than the brief itself. Alarming, 26.4% of participants admitted to knowingly engaging in health-risk behaviours during deployment, highlighting a significant gap between awareness and practice. The prevalence of DNBI, self-reported at 22.7%, underscores the clinical importance of addressing risk-taking behaviours more effectively.

Conclusion

The findings suggest that while the concept of health briefs is widely supported, their current design and delivery fail to achieve meaningful behaviour change. High baseline awareness of health risks among participants indicates that the brief contributes minimally to existing knowledge. The prevalence of risk-taking behaviours despite this awareness points to deficiencies in the health brief's ability to translate knowledge into action. This misalignment emphasises the need for health interventions underpinned by behavioural science to address underlying factors influencing health decisions.

To enhance the effectiveness of health briefs, it is recommended that military health interventions integrate behavioural science frameworks such as the Capability, Opportunity, Motivation - Behaviour (COM-B) model within the Behaviour Change Wheel (BCW). These tools provide a structured approach to designing interventions that address psychological, social, and environmental determinants of behaviour.

This research offers a critical perspective on the limitations of pre-deployment health briefs and provides actionable recommendations for their improvement. By incorporating behavioural science principles, future health interventions can better equip military personnel when required to deploy to high-risk environments.

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Abbreviations

EH - Environmental Health

DNBI - Disease Non-Battle Injury

DHSC - Deployed Health Surveillance Capability

EpiNATO - NATO standardised epidemiological returns on morbidity

FHPB - Force Health Protection Board

FHPI - Force Health Protection Instruction

HTA - Health Threat Assessment

MoD - Ministry of Defence

PJHQ - Permanent Joint Headquarters

RAF - Royal Air Force

RN - Royal Navy

SME - Subject Matter Expert

AAC – Army Air Corps

AGC – Adjutant General Corps

AMS – Army Medical Services

Inf - Infantry

RE – Royal Engineers

REME – Royal Electrical & Mechanical Engineers

RSigs – Royal Signals

Int – Intelligence Corps

RLC – Royal Logistics Corps

RN – Royal Navy

RAF – Royal Air Force

JNCO – Junior Non-Commissioned Officers (Lance Corporal & Corporal) (note: also includes Private Soldiers in this study)

SNCO – Senior Non-Commissioned Officers (Sergeant, Staff Sergeant, Warrant Officer)

Key Terms

Decompression Phase: The staging post is used to enable SP to adjust back to a 'normal' environment from the high-stress and alert state required in an operational environment

Disease Non-Battle Injury (DNBI): An illness or disease a member of the military can succumb to on operational tours which do not involve a traumatic incident such as a bullet wound or IED injuries.

Joint Medical Employment Standard (JMES): A system to record the medical fitness of Military Personnel

Operational Establishment Table (OET): A list of SPs deployed into specific roles.

Pre-Deployment Training (PDT): Training required by all military personnel to prepare them for the theatre of deployment. This training includes military skills as well as Health Briefs.

Military personnel: Personnel serving in the Army, Royal Navy or Royal Air Force of all ranks.

Theatre of deployment: A country where operational tasks are being carried out by military personnel.

COM-B model key terms:

Capability: Refers to the individual's psychological and physical capacity to engage in the activity. This includes having the necessary knowledge and skills. Psychological Capability and Physical Capability

Opportunity: The external factors that make the behaviour possible or prompt it. These can be social or physical.

Motivation: The internal processes that direct and sustain behaviour, including reflective and automatic mechanisms.

Behaviour: The specific action or set of actions performed by an individual.

Attitude: Individuals' evaluations and feelings toward particular objects, issues, or people.

CHAPTER 1 – INTRODUCTION

1.1 Introduction.

In an increasingly volatile and unpredictable world, safeguarding the health of British military personnel so they can protect the security of the United Kingdom, and our allied nations has never been more critical. Every preventable illness or injury erodes unit cohesion, undermines operational effectiveness, and compromises mission success in a world where security threats demand peak readiness.

British military personnel are often deployed to austere environments around the world with a heightened risk of Disease Non-Battle Injury (DNBI). Joint Military Doctrine (JP 4-02, 2012) defines DNBI as: “All illnesses and injuries that are not a direct result of enemy or terrorist actions but still degrade operational effectiveness”. DNBI is not limited to but includes diarrhoea and vomiting, dental pain, musculoskeletal injury, skin conditions and infectious diseases (Murray & Yun, 2016). DNBI can significantly reduce force strength and operational effectiveness. Studies have shown that during deployments, DNBI accounts for up to 30% of total casualties in specific conflicts, far surpassing battle-related injuries (Kauvar, 2020).

Therefore, DNBI remains a concern to the medical and military chain of command, accounting for considerably more morbidity than traumatic injury (Ross, 2016; Wilson, 2013). Apart from the apparent effects on the individual, this also leaves a commander with a reduced workforce, which affects their ability to complete the unit mission.

Several interventions have been implemented to address this health concern, including Pre-Deployment Training (PDT). PDT is part of the broader initiative of Force Health Protection (FHP), which is defined as: “...the conservation of the fighting potential of a force so that it is healthy, fully combat effective and can be applied at the decisive time and pace. It consists of actions taken to counter the debilitating effects of environment, disease and selected special weapons systems through preventive measures for personnel, systems, and operational formations” (AJMS Doctrine, 2006)

The 'health' aspect of PDT involves a one-hour 'health brief' given by an Environmental Health Practitioner in addition to other Force Health Protection (FHP) measures such as health and fitness checks, vaccinations, prophylactic medications (if necessary) and the issuing of equipment given to those deploying preparing them for the environment they will be entering.

The health brief has been delivered to deploying Military personnel for several years, with very few changes and advancements to the content or mode of delivery during this period. This lack of progress is particularly troubling given the British Military's operations across dramatically different environments, each presenting unique and evolving health challenges. Defence health surveillance figures on DNBI rates also demonstrate that prevalences showed no improvement during this period (DSTL Report, 2018 [security redacted]).

Although the health brief is not exclusively responsible for this (other Force Health Protection (FHP) factors have an influence, too), it has a part to play as the health brief is the conduit for delivering the health messages to individuals and their Chain of Command. The health brief aims to empower military personnel to stay as healthy as possible whilst deployed. The health brief also arguably serves as a procedural requirement which prevents litigation (i.e. the MoD has provided (and can prove) that military personnel have been presented with the health information they need); if the service person has not understood the health message, then the effectiveness is diminished.

This research seeks to explore the barriers to health behaviour change among military personnel, obtaining insights from behavioural science to propose transformative improvements to the design and delivery of pre-deployment health interventions. By integrating behavioural science theory with the unique demands of the military, this research aims to redefine pre-deployment health interventions, ultimately contributing to a healthier, more resilient fighting force.

1.2 Explanation of the Chapters.

This thesis is structured to systematically address the research aims and objectives, providing a logical flow of information and insights. Below is an explanation of each chapter:

Chapter 1: Introduction

This chapter sets the stage by introducing the research topic and why it matters. The philosophical stance is explored, including the ontology, epistemology and paradigms that provide the foundations to this thesis.

It highlights the importance of PDT health interventions in the British military, that have the potential to reduce DNBI. It explains the motivation behind the study, outlines its key aims and objectives, and summarises the unique contributions the research makes to understanding and improving health interventions.

There is a 'scene setting' section on Iraq, which is important for the reader so they can relate to the environment the military personnel are operating in.

Chapter 2: Literature Review

The Literature Review chapter delves into existing published research to set the context for the study. It explores DNBI trends, theories of behaviour change, and established health intervention frameworks. The Theory of Planned Behaviour (TPB) and the COM-B model are discussed in detail as the guiding theoretical frameworks for the research. This chapter also identifies gaps in current knowledge, building a strong case for why this study is needed.

Chapter 3: Methodology

This chapter explains how the research was conducted. It describes the Mixed Methods Research (MMR) approach used, combining quantitative data from questionnaires with qualitative insights from focus groups. The reasoning behind this approach is discussed, along with details about the participants, data collection processes, and ethical considerations. The chapter also reflects on the limitations of the methods to ensure transparency.

Chapter 4: Results

This chapter presents the findings with the quantitative data being presented first. The qualitative study findings, and most importantly, where they integrate, are used to present what the research uncovered. Table 1 shows the studies carried out as part of the MMR.

Table 1: An overview of the studies carried out in this research.

Study Title	Data Collection Method	Date/ Cohort
An investigation into the effectiveness of the health brief in changing behaviour in a military population.	Quantitative: Questionnaires	Cohort 1: Jan 2018
		Cohort 2: Nov 2018
A qualitative exploration of the views of military personnel returning from an overseas deployment on the effectiveness of the pre-deployment health brief.	Qualitative: Focus Groups	JNCO: 11 Jun 2019
		SNCO: 12 Jun 2019
		Officers: 10 Jun 2019

Chapter 5: Discussion

This is where the findings are brought to life by exploring what they mean. The chapter connects the results to the broader literature, examining the implications for theory and practice. It delves into why some health interventions work better than others and how military culture influences behaviour change. Practical suggestions are made for improving the delivery of health interventions, with a focus on addressing gaps between awareness and action.

Chapter 6: Recommendations

Building on the discussion, this chapter offers clear and actionable recommendations for designing and delivering more effective health interventions. It advocates using behavioural science models like COM-B and suggests tailored strategies to meet the unique needs of military personnel. These recommendations are grounded in the research findings and aim to make a tangible difference in how health interventions are planned and delivered.

Chapter 7: Conclusion

The final chapter summarises the key findings and their significance. It reflects on the research journey, acknowledging the study's limitations and highlighting opportunities for

future research. Suggestions are made for exploring long-term impacts and testing innovative delivery methods to further advance the field.

1.3 Significant Original Contribution to Knowledge

This PhD thesis and the findings aim to provide a significant original contribution to knowledge by addressing a critical gap in military health research: the application of behavioural science theories to enhance PDT health interventions (specifically the health brief) for British military personnel. The key contributions anticipated:

This research will be the first to explore military personnel's views on whether the Health Brief resulted in any health behaviour change. Existing research explores the prevalence of DNBI across different deployments but fails to examine how military personnel perceive health interventions designed to mitigate these risks. This thesis fills that gap by directly investigating whether deployed personnel believe the PDT health brief provides effective guidance. It identifies cultural, psychological, and operational barriers that impact health-related behavioural change, something previous studies have not contemplated.

This research will additionally bridge the gap between behavioural science and military health interventions. While behavioural science models (e.g. the COM-B Model and Health Belief Model) are widely used in public health, their application to military health interventions is limited. The thesis aspires to present the argument that traditional military health interventions do not align with psychological determinants of risk-taking.

Identifying cultural and operational barriers to health behaviour change is an important aim of this thesis as it is believed that military personnel face unique pressures that influence their health decision-making. These barriers are not adequately accounted for in current military health training, leading to a disconnect between knowledge and practice.

Evidence-based recommendations for military health policy will present themselves from the findings of this research which will result in engaging military personnel effectively.

This research has real-world impact on military health intervention as the practical implications could go beyond pre-deployment health briefs, extending to malaria prophylaxis

compliance, vaccine uptake, and psychological preparedness for Chemical, Biological, Radiological, and Nuclear (CBRN) incidents, for example. This research also paves the way for future interdisciplinary collaboration between military forces, NATO allies, and public health agencies.

This research goes beyond traditional epidemiological studies on DNBI and offers a behaviourally-informed approach to military health interventions. By integrating behavioural science models with military-specific challenges, the thesis provides an innovative contribution that has both theoretical and practical implications for military health policy and training.

1.4 Rationale.

The rationale around conducting this research is that it presents an opportunity to address the knowledge gap surrounding military personnel. This thesis will provide an insight into the behaviours of military personnel which has been lacking previously. This subsequently leads onto shaping the future design and content of all health interventions in the military.

The British Military has a presence in most countries worldwide (Ministry of Defence, 2025). Still, there are likely to be further military deployments in support of the current wars in Ukraine and Gaza, amongst other conflicts that arise. It is important to ensure that those who may deploy in the future are provided with the knowledge and support to reduce or prevent DNBI while carrying out their mission, as part of the holistic management of preparing the military to deploy.

It is imperative for the British Military to have the ability to identify the key influential factors within this cohort so that a targeted and 'behaviourally informed' pre deployment intervention can be carried out. This saves time and money but also tackles efficiency and effectiveness. It is important to continue to evolve health interventions and make improvements as our understanding increases, as this will improve the effectiveness of the health brief and ultimately force health protection. Additionally, an effective health intervention will build credibility within the cohort that we serve to protect.

If DNBI prevalence is reduced, it also reduces the medical and logistical burden on the chain of command, which includes potential evacuation of DNBI casualties, placing medical and support teams in danger.

A further consideration, relevant to the credibility and perceived legitimacy of pre-deployment health advice, is the possibility that personnel's willingness to take individual responsibility for their own health may be shaped by their perception of the organisation's own conduct in this regard. Ultimately, military personnel may reasonably question why they should take health risks seriously if the chain of command places them in situations involving environmental or occupational health risks that lie outside their own control. This tension has some grounding in the concept of the psychological contract (Rousseau, 1989), which describes the implicit, reciprocal obligations perceived to exist between an individual and their employing organisation; where an organisation is perceived to fall short of its own obligations, whether by exposing personnel to unmitigated hazards, providing inconsistent protective measures, or failing to act on identifiable risks, individuals may correspondingly feel less obligated to uphold their own side of that relationship, including compliance with health-related guidance. If this dynamic operates within a military population, it would suggest that the effectiveness of pre-deployment health advice cannot be considered in isolation from personnel's broader perceptions of CoC consistency and care, a possibility this thesis returns to in later chapters.

1.5 Research Aims and Objectives

The following considerations were taken into account when formulating the research question for this research based on military medical planning and research questions designed by Bricknell and Moore (2007). The subject area is broad as it relates to DNBI and health in general, which encompasses a broad and diverse range of issues. Preliminary reading involved initial exploration which revealed that DNBI rates have remained relatively unchanged over the years, highlighting a persistent problem. There is no existing data on what drives behavioural changes within this particular military cohort. The author chose to focus on pre-deployment training, explicitly investigating how we prepare military personnel

for deployments and the role of health interventions in changing behaviour and impacting DNBI rates. This approach aligns with the need for targeted research into behavioural health interventions within military settings (Bricknell & Moore, 2007).

Aim

This thesis aims to explore the attitudes and behaviours of military personnel towards a pre-deployment training health intervention (the health brief) designed to reduce DNBI on operational tours overseas.

Objectives

To achieve this aim, the following research objectives were developed:

1. Assess behaviour change linked to the health brief: To identify if participant reported changing their behaviour as a result of the health brief.

This objective seeks to provide a foundation for understanding the health brief's effectiveness.

2. To explore the participants attitudes towards the pre-deployment health brief.

This objective aims to assess whether attitudes are associated with disengagement from the health brief.

3. To investigate participants reported DNBI and what condition they suffered from.

This objective focuses on understanding if and how the health brief provided the knowledge on DNBI that aimed on preventing participants from suffering from an illness or injury.

4. To evaluate participants' perceptions of the method and delivery of the pre-deployment health brief.

This objective aims to assess the suitability and effectiveness of the delivery format of the health brief as perceived by the Military personnel, including any feedback on its content, accessibility, and mode of communication.

5. To explore the underlying reasons behind any risk-taking behaviours related to health during deployment.

This objective seeks to uncover the factors that may lead military personnel to engage in health-risk behaviours, despite the health advice provided in the pre-deployment health brief.

1.6 Scope

This study explores the factors influencing behavioural change in military personnel using a PDT health intervention (the health brief). Therefore, incorporation of behavioural change theories and models such as COM-B (Michie et al., 2011), Theory of Planned Behaviour (Ajzen, 1991) and Risk Homeostasis Theory (Wilde, 1982) will be covered.

The study focuses on British military personnel who deployed on Op SHADER in Iraq and received a PDT health brief between Jul 2018 and December 2019.

This research does not include personnel from allied forces or non-deployable military staff. It will also not discuss other PDT Force Health Protection (FHP) measures such as vaccinations, personal protection equipment or medical facilities, nor aim to evaluate broader military operational effectiveness beyond health interventions. DNBI in the 'firm base' (at home in UK or sovereign bases) will also not be an element of this thesis, which concentrates on operational tours overseas.

1.7 Background

1.7.1 Disease Non-Battle Injury (DNBI).

To introduce the issue, this section will address DNBI in the British Military whilst Military personnel are deployed. Disease Non-Battle Injury (DNBI) can be explained as, "injuries and illnesses incurred by military personnel that are not directly related to combat or enemy action" (Murray & Yun, 2016). In military publications, DNBI is defined as "all illnesses and injuries not resulting from enemy or terrorist action or caused by conflict" (JP 40-2 Joint Health Services publication).

If there are DNBI casualties during operations, then this presents a significant challenge to the Commanders in the form of providing treatment and evacuation of the service person(s).

If the numbers of troops are reduced, this may impact the mission's achievability. The Staff

Officers Handbook (UK Ministry of Defence, 1988) provides estimates of casualties expected for differing scenarios, which must be added to a Commander's planning assumptions before every Operation.

DNBI encompass a broad spectrum of medical conditions, including "infectious diseases, non-combat trauma, environmental injuries, and other health issues encountered during military service that are not caused by enemy engagement" (Murray & Yun, 2016). The most prevalent DNBI can change depending on the country of operation. DNBI significantly impacts military operations, necessitating attention to prevention, management, and mitigation strategies to maintain the health and effectiveness of military forces.

Pre-deployment preparation, preventative measures/prophylaxis (such as vaccines), and advances in equipment to improve hygiene all strive to improve DNBI rates. However, recent conflicts in Iraq and Afghanistan still report 30% DNBI (Kauvar, 2020).

Further research should provide the information for a more targeted approach when designing military health interventions. Therefore, the first section of this literature review will analyse DNBI rates historically and on recent operational tours and then discuss the types of diseases on operational tours identified by the paper authors. Trends, if any, will be highlighted, and the paper's recommendations will be discussed, determining if there are similarities or contrasts in opinions. Current literature is centred around DNBI Epidemiology (prevalence), risk factors and the impact amongst military personnel.

DNBI has historically caused more deaths during war than battle injuries (Withers, 1999) and made up the majority of military casualties (Sartin, 1993). There are numerous papers published on the prevalence of DNBI in military personnel, such as malaria (Tuck et al., 2003; Wallace, 1996), gastrointestinal disorders (Connor, 2012; Riddle, 1984, Sanders et al, 2001) Hepatitis A (Hesla, 2001) and on various deployments such as DNBI in Kosovo on Operation JOINT GUARD (McKee, 1998) and Afghanistan on Operation HERRICK (Fawcett, 2010).

The factors contributing to the risk of DNBI on operations for an individual include their job role (and therefore their occupational exposures), how physically fit they are, psychological

resilience, and socio-demographic characteristics (Smith, 2011). Deployments to operational theatres, particularly in tropical and austere environments, are associated with an increased risk of infectious diseases, heat-related illnesses, and traumatic injuries. Additionally, occupational hazards, such as combat-related activities (weapons training, section attack training and hand to hand combat training) and strenuous physical tasks, contribute to the burden of musculoskeletal injuries and psychological stress.

To relate the above review outcomes on DNBI to this thesis's aims, it has shown that DNBI remains an issue. Although the prevalence of DNBI has reduced over the years (Alcover et al., 2025), it is still a considerable burden to the military. However, we can identify the most frequently seen DNBI, which can relate to the information provided in a pre-deployment health intervention. Research is needed on the individual's perception of this information and a way to assess if Military personnel absorbed the information, along with whether the DNBI rates were reduced because of the intervention (which may require a change in health behaviour).

1.7.2 British Military Context

To contextualise the quantitative and qualitative data gathered for this thesis, it is prudent to provide background information to the reader on the British Military and the environment in which they operate.

The British Military operate globally across a spectrum of missions, including combat, peacekeeping, training, and humanitarian assistance. These operations are increasingly conducted in complex, multinational environments where personnel must adapt to diverse physical, cultural, and organisational challenges (Ministry of Defence, 2021). Among these, overseas deployments to the Middle East, such as under Operation SHADER in Iraq, provide a good example of contemporary expeditionary military activity.

Launched in 2014, Operation SHADER represents the United Kingdom's contribution to the international coalition against the Islamic State in Iraq and Syria (Ministry of Defence, 2023). British military personnel deployed on this operation undertake a range of roles including training and advising local forces, intelligence and surveillance, and force protection. These

roles are performed across multiple locations such as Taji, Erbil, and Besmaya, each characterised by differing levels of infrastructure, environmental exposure, and operational tempo.

The operational environment in Iraq presents a range of health threats that extend beyond those typically encountered in the United Kingdom. Extreme climatic conditions, including sustained high temperatures and pervasive dust, contribute to dehydration, heat-related illness, and respiratory irritation (World Health Organization, 2020). Environmental hazards such as poor air quality, often exacerbated by the burning of waste materials, and inconsistent sanitation infrastructure further compound these risks (Shrestha et al., 2018). In addition, personnel may be exposed to infectious diseases, including gastrointestinal illness associated with food and water hygiene, as well as zoonotic risks linked to stray animals (Connor et al., 2019). These threats are often shaped by local practices, host-nation infrastructure, and the constraints of deployed settings, creating a dynamic and context-dependent risk landscape. To mitigate these risks, the British military employs a structured approach to force health protection, incorporating pre-deployment training (PDT), medical screening, vaccination programmes, and health education (Ministry of Defence, 2019). Within PDT, health briefings are intended to provide personnel with the knowledge necessary to recognise and manage environmental and occupational health risks. These briefings are typically delivered prior to deployment and may be reinforced during Reception, Staging, Onward Integration (RSOI) processes once personnel arrive in theatre (NATO, 2013). The content of such briefings commonly includes hygiene practices, vector-borne disease prevention, environmental hazards, and personal protective measures. Military environments are characterised by competing operational priorities, time pressures, and varying levels of resource availability, all of which may influence adherence to health guidance (Jones et al., 2010). Given the importance of maintaining force readiness and operational effectiveness, there is a clear need to better understand how health information is communicated, received, and applied in deployed military settings.

Conditions and Environment on the Iraq deployments.

Collection of the quantitative and qualitative research data for this thesis was from Military personnel returning from a deployment to Iraq where they were involved in training Iraqi forces. It is therefore helpful to provide a background on their working environment, enabling a degree of scene setting.

The information presented here is anecdotal from the Military personnel who completed Iraq tours, but this is pertinent as this thesis is concerned with the views and experiences of this group.

OPERATION SHADER is a British Tri-Service and Coalition Forces commitment located in Iraq over five locations (location camp names have been redacted for security reasons). The tour length is six months for Army personnel, Royal Air Force personnel deploy for four months, and the Royal Navy personnel have varying times on board their ship, depending on their mission (they can also be diverted as seen after the Hurricane Erma humanitarian mission). Most of the personnel on the training teams (and therefore participants in this research) are Army. The Relief in Place (RIP) occurs at the six-month point for the Army Infantry Regiments and is a significant logistical process involving returning personnel and equipment to the UK. From a health aspect, there is a spike in DNBI (mainly diarrhoea & vomiting or respiratory disease) during this RIP period. The total British personnel in theatre at one time ranges from 300 to 3,000.

This research covers the deployment timeline of July 2018 to December 2019. During this time, 2nd Battalion The Mercian Regiment (2 MERCIAN), 2nd Battalion The Rifles (2 RIFLES), 2nd & 3rd Battalions The Royal Regiment of Scotland (2 SCOTS & 3 SCOTS), 22 Engineer Regiment (22 ENGR) completed their tours of Iraq. Military personnel will have had a two-week rest and recuperation (R&R) period in the UK, staggered throughout their six-month deployment.

The Senior Medical Officer gave the following overview, reporting that the environment was hot, dry and dusty. Sandstorms were intermittent and severe. Daytime temperatures during the summer exceed 50°C, and winter temperatures are often in single figures at night.

During the small amounts of spare time available, Military personnel would be involved in sports (mostly volleyball and basketball) to occupy themselves. The games were generally risk assessed, and a Physical Training Instructor (PTI) was responsible for the session, which included ensuring the health and safety of the participants playing the sport. 2RIFLES deployed with their senior PTI who would regularly run Coalition-wide physical training sessions in the Gym. UK personnel had minimal contact with the local civilian population and the training audience was accommodated off-site.

The following is a description of the camps inhabited in Iraq (full name withheld due to security reasons) which was given by those who lived in them for the duration of their tour. The evidence is anecdotal but provides an insight into the conditions from the service persons' perspective. The Regimental Medical Officer on the tour was consulted and validated the information provided from what he had experienced.

Camp A is based on a large airbase, with large expanses of concrete. There was a population of 4,000+ personnel from across the coalition and contractors. Life support and logistics were provided by a large US services company. Camp A housed the largest population on Op SHADER. The Military personnel based in this camp for the six-month deployment were predominantly 2 RIFLES, who are a British Army Infantry Unit. Attached personnel included 22 Engineer Regiment and Individual Augmentees (IAs), who made up training teams and were responsible for Base Security. The total number of British personnel in Camp A was approximately 250 during the period of this research, but combined with Camp U III, the total population at risk was 276 personnel.

The Medical Support at this location consisted of one Regimental Medical Officer (General Practitioner) and five Combat Medical Technicians (CMTs).

All IA's personnel received a PDT health brief at RTMC Chilwell before the deployment. Formed units received a health brief as part of their regular PDT package. The Regimental Medical Officer also gave individual health briefs to personnel who booked them. During the deployment, the medical team delivered the health briefings as part of Reception, Staging, Onward Movement and Integration (RSOI), which is conducted as personnel arrive in

theatre, emphasising heat injury and local medical facilities. Malaria prophylaxis was not required.

The living conditions in this camp consisted of Containerised Housing Units (CHUs) where personnel lived in maximum of two-person rooms, with beds, laundered bedding, wifi and air-conditioning. The sanitation facilities were of a high standard, with plumbed ablutions and some “porta-loos.” There were intermittent periods of water rationing due to shortages, although this did not result in any increased gastrointestinal illness. Hand washing facilities were enforced at the entrance of the dining facility. The US contractors prepared the food, and food hygiene was maintained at standards comparable to those of the UK. No outbreaks were attributed to poor food hygiene or food preparation during this research period. All drinking water was bottled and provided under the US contract. Non-potable water was used for showering and laundry. There were a number of feral animals who found their way onto the camp and roamed freely. These were controlled by the Veterinary Officer, and military personnel were ordered not to approach the animals or keep any as pets.

The increase in hand hygiene was facilitated by the provision of accessible handwashing facilities prior to meals in the Regimental Restaurant (commonly referred to as the ‘Cook House’). This aligns with the COM-B ‘opportunity’ to carry out a good health practice due to having the equipment needed.

The Regimental Restaurant is a communal dining space where military chefs serve three daily meals to personnel, this setting provided both the infrastructure and social reinforcement necessary to establish consistent hygiene practices. The social reinforcement links to the theory of subjective norms which posits that the military personnel will be influenced by what hand washing procedures their peers and friends are doing. and it was reported by the participants that there was also the opportunity to be able to wash hands.

Approximately 60 personnel based at Camp B from 2 Mercian Regiment are a British Army Infantry Unit. The Spanish military provided logistical support, which included food, water, and sanitation. The Environmental Health Officer who advised this camp reported a

widespread and serious diarrhoea & vomiting outbreak which affected several personnel and was linked to the food preparation. Access to this camp by medical and environmental SME's was restricted, which resulted in inspections of kitchens and ablutions being limited. Conditions in Camp B were reportedly the poorest out of all the camps.

There were approximately 80 personnel based at Camp E from 2 Mercian Regiment and a RAF contingent. Camp E is very small, and therefore, personnel lived in very close proximity to each other. This is known to increase the risk of outbreak spread amongst individuals. A systematic review highlighted that crowded living conditions in military settings contribute to the rapid transmission of infectious diseases, particularly respiratory infections (Murray et al., 2011). Research on U.S. military recruits has also linked increased crowding in barracks to higher rates of acute respiratory disease (Baisley et al., 2015).

There were approximately 20 personnel based at Camp M from 2 Mercian Regiment, and due to the size of the contingent, they operated independently. They reported having good facilities, which they maintained internally as much as possible.

There were approximately 60 to 80 personnel based at Camp T. This was a large camp run by the US military which had gym facilities and recreational sports such as volleyball and table tennis. The camp was heavily fortified as it was previously an Iraqi base during the Iraq war, but British military personnel could leave the compound. This is where there was access to local food shops.

[British Military Health Surveillance.](#)

This section will explain the health surveillance landscape during British military operations, including how this information is collected and findings of relevance such as spikes in DNBI during specific periods. Through anecdotal evidence from Military personnel and validated reports from the Regimental Medical Officer (a General Practitioner), this section also aims to paint a comprehensive picture of the conditions experienced in the camps in Iraq during Operation SHADER, over the time period of the research (2018/19). In addition to 'scene setting', it highlights the critical need for continuous monitoring and adaptation of health strategies to ensure the welfare of deployed personnel and the success of military missions.

Defence Health Surveillance including DNBI prevalence on operations is carried out by the Deployment Health Surveillance Capability (DHSC), NATO Military Medicine Centre of Excellence in Munich, Germany. Analysis is carried out by Defence Statistics based in Andover and DSTL based in Southampton. DHSC work includes monitoring long term trends for illness and injury that significantly impact operational effectiveness, potential for outbreak detection, evaluation of effectiveness of health interventions and knowledge from other missions (e.g. baselines and lessons identified). It therefore provides a common picture for raising situational awareness about health of the force including DNBI.

EpiNATO is the British tool used to collect DNBI data with weekly reports from all MTFs. Dstl used these data to publish an Interim Report and Disease and Non-Battle Injury (DNBI) Factor Analysis in March 2017. The Report aimed to provide a planning tool which could provide Commanders with an estimate of the DNBI they may experience whilst on a particular operational tour. The report included “Admittance To Hospital (ATH)” which means the service person is unable to carry out their duties.

The results show that dermatological conditions present maximally and most frequently in all but one operation. Gastro-intestinal (GI) conditions, however, cause the highest Admittance To Hospital (ATH). The most commonly presenting condition types across all operations were: dermatological conditions, musculoskeletal conditions, respiratory conditions (upper and lower respiratory tract infections, ear, nose and throat (ENT) disorders and influenza-like illness), sports injuries, non-sports injuries, gastro-intestinal (GI) conditions, dental/oral conditions. Climate and operation type are influential factors with respect to overall DNBI presentation and the presentation of different condition types. Their recommendation was that both dermatological and GI condition types should be monitored and planned for appropriately as they significantly impact on medical and logistical resources.

There was no significant reduction in reported gastrointestinal disease throughout the ten-year Operation HERRICK campaign in Afghanistan (Connor, 2013) indicating that this remains an issue.

1.7.3 Training the Military (including PDT)

It is well known that the British Army used to train personnel using aggressive, fear-evoking, punishment-led tactics, but recently, it has had to modernise its practices (Future Soldier Guide, 2021). Not all people respond to this kind of training, which can have the opposite effect on some. There have been high-profile bullying and harassment cases involving training units, which have been an embarrassment to the MoD but also ended in tragedy (examples: The Sunday Times, 2024; Centre for Military Justice, 2024).

In 2010, the British Army Directorate of Force Development and Training Command started a new annual experimentation and operational analysis process under the overarching name of Exercise (Ex) AGILE WARRIOR. Ex AGILE WARRIOR aimed to provide an evidence base, drawn from lessons, research and experiments, upon which to base decisions on the future development of land forces. Ex AGILE WARRIOR has four Force Design Principles, with the first, “Investing in and developing the people required for the future force,” being critical to this thesis as it envelopes keeping military personnel healthy and training them effectively. In particular, Ex AGILE WARRIOR 11 in 2011 recommended that “significantly greater emphasis is placed on the value of the officer and the soldier” cognitive skills. The current Health Brief given to deploying personnel requires little cognitive skill as the participant has the information presented to them rather than actively taking part in the session. Therefore, new training techniques for military personnel use have been investigated since Ex AGILE WARRIOR in 2011. Berry et al. (2020) designed a quasi-experimental study to explore the impact of the “Present, Apply, Review” (PAR) teaching technique on training new Army recruits under the Ex AGILE WARRIOR banner. The PAR teaching technique is a constructivist approach designed to enhance learning by structuring lessons into the three phases. In the ‘present’ phase, instructors introduced new material, outlining learning objectives and connecting the content to prior knowledge. The recruits engage in activities that require them to apply the newly presented information, emphasising problem-solving and decision-making tasks, such as group discussions, case studies, practical exercises, and creating mind maps. The final phase to review consisted of sessions where recruits reflect on their learning—this involved question-and-answer sessions,

quizzes, or discussions to assess understanding and reinforce key concepts. The effectiveness of the PAR method was evaluated based on recruits' motivation, self-regulation, and reflective thinking. However, the study found no significant positive effect of the PAR method compared to traditional instruction in these cognitive areas. Follow-up interviews suggested that factors such as individual predispositions, the motivational climate set by instructors, and recruits' self-regulation skills influenced the effectiveness of the PAR approach (Berry, 2020).

This research highlights the complexities of implementing constructivist teaching methods like PAR in military training environments and suggests that multiple factors contribute to their effectiveness. Following Ex AGILE WARRIOR, the Integrated Review of Security, Defence, Development and Foreign Policy was released in 2021 and covered future training requirements for the military and investment and development in training strategies appropriate to this cohort. The 'Future Soldier' initiative is a key part of this transformation, aiming to create a more lethal, agile, and expeditionary force (Future Soldier Guide, 2021). Building on these strategic developments in the military, the findings of this PhD aim to inform policy and advance the delivery of health training before overseas deployments in the military.

PDT is mandated for all Military personnel before an operational deployment, irrespective of the mission or area of operation. PDT includes military training (such as weapons tests, cultural education and laws of armed conflict), fitness tests and a "health" section, which is the area of interest in this research. This thesis will not explore the attitudes towards the other areas of PDT, such as the military training serials, as they do not impact health behaviour.

The health section includes a health brief in addition to Joint Medical Employment Standard (JMES) checks, vaccinations, prophylaxis medications and the issuing of equipment necessary to prepare SP for the environment they will be entering. The health brief aims to provide Military personnel with the information they require to reduce the DNBI burden on

the operational tour. The PDT includes a one-hour health brief, which an Environmental Health Practitioner delivers on the specific health threats and subsequent preventative advice within the theatre of deployment. The health brief is the health intervention which is the focus of this research, explicitly investigating if it is “fit for purpose”, which is defined as providing the service person with the relevant and specific information (including health intelligence in the area of operation), to enable them to protect themselves and those they are responsible for. This research also investigates the attitudes and behaviour of Military personnel towards the health brief.

Bricknell and Moore (2007) clearly articulated the importance of PDT as part of a medical force protection plan. They specifically recommend that all Military personnel be “educated and trained in regard to health hazards of a specific deployment” to enable them to minimise the risk of personal ill health. They also say that the Mobile Health Instruction Team will supplement this education and training with a “just in time” pre-deployment health brief covering the health hazards specific to a particular military operation. This health brief should be reinforced during the theatre arrival brief [ROSI package], and individual aide memoirs and entries into the theatre and unit standing orders should also be used. The author acknowledges Bricknell and Moore’s paper, “Health risk management matrix – A medical planning tool,” which ideologically depicts the gold standard of medical force protection. In real-life situations, this may not always go to plan. MacMahon (2019) provides an example to support this when deployed on Operation RUMAN. Operation RUMAN was the British government’s combined military and humanitarian operations to relieve the British Overseas Territories in the Caribbean. MacMahon admits that Force Health Protection preparations were ‘sub-optimal’ due to the rapid deployment of Military personnel in support of this natural disaster. The timing of a PDT health brief is an area explored in this thesis as Op RUMAN is an example of when there would be a need for flexibility in delivering the health brief, depending on the timescale before deployment. Pre-deployment preparedness has also been examined in relation to treatment response among military personnel diagnosed with post-traumatic stress disorder (PTSD), with preliminary evidence suggesting that greater

preparedness may moderate the relationship between combat exposure and the rate of improvement in PTSD symptoms during exposure therapy (Price et al., 2013). This study offers preliminary support for the value of pre-deployment preparation as a factor in later treatment outcomes, it does not establish a direct causal link between preparation time and PTSD reduction, and further prospective research would be needed to substantiate this relationship.

Bricknell et al. (2016) analysed the UK Defence Medical Services' role in the Ebola crisis (Operation GRTIROCK) and described the PDT steps taken. In the observations and events section, the reader was informed that there were six malaria cases and that "lower reported cases" of DNBI (malaria and diarrhoeal disease) were found. If DNBI was lower, it did not indicate that the PDT health brief contributed to this.

Other organisations have identified new challenges in providing healthcare and managing the high incidence of endemic disease, including the United Nations (UN) in the context of its Peacekeeping Operations (PKOs) (Johnson, 2015). The UN's approach to pre-deployment health training illustrates this challenge. Dammen Consultants Norway are the organisation that compile the UN's Core Pre-Deployment Training Materials (CPTM) from contributions by several national training centres. CPTM materials are provided as self-directed study documents, which personnel are advised to complete and for which they self-print a certificate prior to deployment (Dammen Consultants Norway, 2014). Notably, there is no evaluation of UN personnel's attitudes towards this training, nor of whether engagement with it produced any behavioural change. This absence of evaluation may, in part, reflect the structure of responsibility for peacekeeping training more broadly: whilst the UN develops and provides training standards and materials centrally, responsibility for the delivery, enforcement, and verification of completion rests largely with individual troop- and personnel-contributing countries, resulting in a fragmented system in which no single body is positioned to systematically evaluate outcomes across the whole peacekeeping workforce. The self-directed, print-your-own-certificate format is also notable in relation to the broader literature on health behaviour change discussed elsewhere in this review; a passive, self-

administered information resource of this kind lacks the interactive elements, such as reminders, perceived risk framing, or follow-up reinforcement, that have been associated with improved uptake of preventative health behaviours in comparable populations. It is therefore plausible that, even where PDT materials are completed, engagement may be superficial, oriented towards obtaining the certificate rather than towards genuine attitudinal or behavioural change, though this remains speculative in the absence of evaluative data. Further research is needed to establish completion rates amongst UN personnel, the extent to which completion is enforced or verified, and the effectiveness of this training in shifting attitudes and behaviour; such research would help clarify whether the current format is adequate, or whether a more structured and monitored approach, comparable to those recommended for military populations, would be of greater benefit.

All the research indicates that additional time is needed to ensure preparation for deployment and get the information to the Military personnel; otherwise, DNBI increases.

1.7.4 Health Interventions in the Military.

Health information has been provided to deploy Military personnel, but the effectiveness of the health interventions at changing behaviour and reducing risk-taking is not apparent. The following section will review health interventions intended to reduce DNBI in military personnel and then explore other health interventions within the military cohort, such as alcohol reduction and sexual health campaigns.

Health interventions are activities designed to improve or maintain the health of individuals or a population and can be delivered in different ways. Health interventions in the military include medical treatments such as vaccination programmes, public health initiatives such as smoking cessation interventions through policy changes and educational programs such as the PDT health brief.

The World Health Organisation's (WHO) definition of a health intervention is:

"...acts performed for, with or on behalf of a person or population whose purpose is to assess, improve, maintain, promote or modify health, functioning or health conditions"

(World Health Organization, 2008). The International Classification of Health Interventions

(ICHI) and the Centres for Disease Control and Prevention (CDC) have a similar definition. Health intervention is also concerned with the aim to “improve health outcomes” and “prevent disease” (Centres for Disease Control and Prevention, 2020). The National Institute for Health and Care Excellence (NICE) states that a health intervention should also “have an effect on the health of individuals or populations” (National Institute for Health and Care Excellence, 2013). Milstein (1999) describes the aim of a health intervention as having the ability to change health-related behaviours, risk factors, environmental conditions, or health status for individuals or populations, which it will be wise to explore later in this thesis. The author will focus on research that includes military participants or health interventions, as health interventions in the military differ from those in civilian environments due to the individual’s job roles. A health intervention in either setting aims to improve health outcomes. Still, military personnel have additional factors that should be considered due to the activities and environments they find themselves in. Those factors include the need to be at ‘Operational Readiness’, exposure to unique health threats, mental health challenges, availability of injury and rehabilitation programs, comprehensive preventive medicine and substance abuse interventions, which will be explained further. There is a need to be “Operational Ready” at all times, so military health interventions prioritise maintaining this, ensuring Military personnel are physically and mentally fit to perform their duties, even under extreme conditions (Ritchie, 2013). There is a constant threat that Military personnel will be exposed to unique health risks such as injuries from kinetic activity, exposure to hazardous environments, and infectious diseases not commonly encountered in civilian life (Smith, 2009). Military personnel may also have specific mental health challenges such as PTSD, combat stress, and the psychological impact of deployment (Hoge, 2004). There are health interventions that are attempting to provide support and treatment to Military personnel who suffer from mental health issues, which will be discussed below. Compared to civilians, Military personnel have access to health interventions which specialise in injury prevention and rehabilitation programs, which are tailored to the types of injuries common in military settings (musculoskeletal injuries, traumatic brain injuries and amputations) (Hauret, 2010).

The MoD implements comprehensive preventive medicine programs that include vaccinations, health screenings, and disease surveillance tailored to the environments where personnel are deployed (Brundage, 2006). Military-specific substance abuse programs address the unique stresses and risks associated with service with targeted treatment programs (Bray, 2008). Families of Military personnel in the UK military cannot access health interventions, unlike in other countries, even though Lester et al., (2010) found that recognising the health and well-being of military families can significantly impact the performance and morale of the service person.

In a study on the uptake of insect bite precautions in a group of Canadian SPs deployed to Kabul, Afghanistan, only 11% applied repellent that day, 21% slept under a bednet at their last sleep, and 78% wore insecticide-treated clothing despite receiving specific health information (Schofield, Crane and Tepper, 2012). The Canadian Military personnel were more compliant if they perceived that the risk of exposure was high and were reminded to use preventative measures. These findings offer some support for constructs central to the Health Belief Model, in particular perceived susceptibility and cues to action, suggesting that risk perception and prompting may be more influential in driving preventative behaviour than the provision of health information alone. However, the study's reliance on a single, self-report survey design limits the strength of these conclusions; self-reported compliance with preventative health behaviours is vulnerable to social desirability bias, whereby personnel may over-report compliance with behaviours perceived as expected of them, potentially inflating the reported uptake figures. The cross-sectional design also precludes any causal inference regarding the relationship between risk perception, reminders, and behaviour; it is equally plausible that personnel who were already more inclined towards preventative behaviour were also more attentive to, and therefore more likely to recall, risk information and reminders. Furthermore, the sample was drawn from a single deployment location and a specific point in the deployment cycle, limiting the extent to which these findings can be generalised to other operational contexts, nationalities, or stages of deployment. Notably, the low uptake of repellent in particular, despite the provision of specific health information,

illustrates a broader pattern evident across the literature: that knowledge provision alone appears insufficient to translate into sustained behaviour change, a pattern consistent with well-documented critiques of purely educational approaches to health behaviour interventions.

The Health Brief given to deploying personnel is a health intervention designed to provide them with preventative advice whilst ensuring some litigation protection for the Ministry of Defence. In this guise, the health brief does nothing more than this definition of a health intervention by McGraw-Hill (2002): *“an activity undertaken to prevent, improve, or stabilise a medical condition”* (McGraw-Hill, 2002) but this definition is too simplistic as it does not identify whether the activity (health intervention) actually achieves what it intends. This is where the research gap and need is.

Ecological levels are interpersonal, organisational, community or societal (e.g. legislators). Interventions at various levels focus on agents, individuals or groups such as boards or committees in positions to exercise control over aspects of the environment (Simons-Morton, 1988). Hawe & Potvin (2009) introduce “Population-level health interventions”, which call for the underlying social, economic and environmental conditions to be considered when looking at policy change needed to reduce health risks. The broader definition from the World Health Organisation (WHO) states: “A health intervention is an act performed for, with or on behalf of a person or population whose purpose is to assess, improve, maintain, promote or modify health, functioning or health conditions” (ICHI, 2018). In their definition, Green and Kreuter (2005) included education and organisational support for behaviour and environmental changes (Green & Kreuter 2005). In addition, health interventions to benefit military personnel must consider the location they will be travelling to, i.e., whether it is meant for a ‘home base’ (within the UK) or overseas (either on combat operations or overseas assignments). Health interventions carried out in the home base have similarities to those found in the local population, such as smoking cessation and sexual health and mental health support interventions. Due to the age demographics (the majority being within the 18 – 25-year-old category), other interventions, such as dementia and stroke awareness, would

not be cost-effective. Overseas, the intervention (the pre-deployment health brief) must include conditions appropriate to the country of operation, including specific tropical diseases and health and safety issues. To carry out an intervention, it is recommended that a framework or tool is followed to ensure the existing literature, theory, and empirical findings have been considered.

1.8 Gaps in the Research

The review identifies several critical research gaps:

There are no formal evaluations of PDT health brief effectiveness in changing military health behaviours. There is a clear need to explore the factors that shape effective health communication and behaviour change within the military. Understanding these factors could inform necessary revisions to the current health brief, making it more impactful.

There is minimal integration of behaviour change theory and models into military health policy, despite evidence supporting their utility in civilian health interventions (Wang, 2021).

While lecture-style health briefs have traditionally been used to address DNBI prevention, this approach has never been formally tested for effectiveness. Given the continued occurrence of DNBI and emerging research on health communication, there is reason to question whether this method is the most effective way to influence behaviour.

Additionally, there is limited research evaluating health interventions in relation to military behaviours and attitudes. While studies have examined health risks in military populations, there is little data on how well interventions translate into long-term behaviour change.

There is an underrepresentation of reservists in military health studies, despite their distinct post-deployment health challenges. Reservists who deploy alongside regular soldiers and receive the same Pre-Deployment Training (PDT) health brief at their Mobilisation Camp, unlike their regular counterparts, do not return to a permanent unit after deployment, meaning they are often lost to the military health system. There is currently no data tracking how this affects their health behaviours post-deployment.

Differences in health attitudes and behaviours across gender and ethnic groups have also been largely unstudied. Research in this area may highlight variations that could refine intervention strategies to be more inclusive and effective.

There is anecdotal evidence of DNBI prevalence in specific deployment locations, but no formal studies have been conducted. For example, outbreaks of diarrhoea and vomiting during training exercises in Kenya have been reported, yet no systematic research has been carried out to investigate the causes or preventative measures.

Another critical gap is the lack of long-term follow-up data on serving personnel. It is unclear whether health interventions continue to influence behaviour after deployment, as there is no longitudinal tracking of their effectiveness.

Several studies have called for further investigation into military personnel's attitudes toward their health to better inform intervention strategies (Wang, 2021). Similarly, opportunities for advancing preventative health measures remain underexplored. Lessons learned from past interventions could be used to improve Force Health Preparation and shape future military health policy.

While many studies emphasise the need to inform policy, there remains a significant gap in research that directly connects intervention effectiveness to policy change. Addressing these gaps will be crucial in developing more effective, evidence-based health strategies for military personnel.

CHAPTER 2 – LITERATURE REVIEW

2.1 Literature Review and Background Context

2.1.1. Introduction and Methodology.

A comprehensive review of the literature on military health interventions and barriers to behavioural change is critical to understanding the efficacy of current practices and identifying gaps. A methodical approach was taken to identify relevant papers and ensure critical discussion points were not missed (Fink 2019). The process began with defining a clear research question, which set the direction and scope of the review (Booth, Sutton and Papaioannou, 2016). This step also helped establish criteria for selecting or excluding studies.

Relevant literature was searched using academic databases, via Open Athens account (including PubMed and PsycINFO etc), were searched for relevant peer-reviewed articles, books, and other scholarly sources.

A combination of keywords and Boolean operators (AND, OR, NOT) was used to refine searches and retrieve the most relevant sources (Hart, 2018). Reviewing reference lists from key studies also helped identify additional materials. Once relevant studies were collected, they were filtered based on inclusion and exclusion criteria. These criteria consider the following factors: publication date, study methodology, and overall relevance to the research question (Bryman, 2016). Applying these filters ensured that only the most suitable studies were reviewed. Systematic reviews were of interest as the strongest forms of evidence owing to their transparent and reproducible methods of identifying, appraising and synthesising the available literature.

After narrowing down the selection, papers were critically appraised, assessing each study's credibility and reliability. Grouping the findings into key themes allowed the recurring debates and gaps in the literature to be identified (Braun and Clarke, 2006). Once published research was identified, it was necessary to 'critically engage' with the work and relate to the research question in this thesis, rather than just summarising it (Hart, 1998). This literature review aimed to link all the research pieces on this thesis's themes (Ridley, 2012).

For this thesis, the subject of military health interventions is very niche. It may be a limiting factor due to the lack of research in this area, but it is an opportunity to investigate behaviour change interventions in a new context.

This chapter provides background information and definitions and critically reviews the literature underpinning this thesis's key themes. It introduces 'the issue' of disease Non-Battle Injury (DNBI) and publications on the prevalence of DNBI in military operations. It is then prudent to look at the types of health interventions in the military and any research which evaluates the effectiveness of health interventions within this cohort. This thesis aims to explore the attitudes and behaviours of military personnel towards a pre-deployment

training health intervention (health brief) designed to reduce DNBI on operational tours overseas. Therefore, there will be an analysis of the literature published on DNBI rates, communicating the health message and risk-taking. The literature review was a “narrative review” where judgement about the relevance and importance of a paper was taken to identify the themes as above.

A note was made of recent publications to ensure the literature review reflects the current state of research in the key areas.

2.1.2 Behaviour Change Introduction

This introduction explains the differences between health behaviour theories, frameworks and models. Practitioners should explore these tools to underpin a health intervention (Michie et al., 2011) because they provide evidence-based guidance for understanding and influencing behaviour. These tools also help identify the factors that drive behaviour, predict outcomes, and design targeted strategies to achieve change.

Health behaviour theories explain why and how people behave in specific ways regarding their health. They provide a systematic understanding of factors influencing behaviour, such as beliefs, attitudes, and social norms (Ajzen, 1991; Bandura, 1986). By understanding these influences, researchers and health professionals can better predict how people might act, pinpoint what needs to change, and develop practical strategies to encourage healthier decisions (Glanz et al., 2008; Michie et al., 2011).

Health behaviour frameworks provide a conceptual structure for organising and integrating multiple theories or ideas. They are broader than theories and focus on what factors to consider and can also explain why behaviours occur (Glanz, K., et al, 2008).

Health behaviour models are simplified representations of how specific variables or constructs interact to influence behaviour. They are often derived from one or more theories and used to test hypotheses or predict outcomes (Michie et al., 2011; Glanz et al., 2008).

The following three sections introduce theories, frameworks, and behaviour change models and provide their strengths and limitations based on an analysis of published literature.

2.1.3 Theories of Behaviour Change

Theory of Planned Behaviour (TPB).

The Theory of Planned Behaviour (TPB) proposes that behaviour is most immediately predicted by intention, which is itself shaped by three antecedents: attitudes toward the behaviour, subjective norms, and perceived behavioural control (Ajzen, 1991). Attitudes reflect an individual's positive or negative evaluation of performing a given behaviour, incorporating beliefs about its likely outcomes and the value placed on those outcomes (Eagly and Chaiken, 1993). Subjective norms capture the perceived social pressure to perform or withhold a behaviour, typically derived from the anticipated approval or disapproval of significant others, such as peers, family, or, in a military context, the chain of command. Perceived behavioural control reflects an individual's confidence in their capacity to perform the behaviour, incorporating both self-efficacy and perceived situational barriers or facilitators. Within the military domain, TPB has been applied to understand help- and treatment-seeking behaviour; Engelhardt et al. (2023), for example, found attitudes, subjective norms, and perceived behavioural control each contributed to whether US Air Force personnel sought mental health support, whilst Britt et al. (2011) reported comparable findings in relation to veterans' treatment-seeking behaviour.

Whilst TPB offers a widely applied reason for the cognitive antecedents of behaviour, its explanatory reach is more limited than its frequent application might suggest. Amongst these limitations is the intention-behaviour gap: meta-analytic evidence indicates that intention typically accounts for only a moderate proportion of variance in actual behaviour, with a substantial minority of individuals who form strong intentions nonetheless failing to act on them (Sheeran, 2002; Armitage and Conner, 2001). This is not a weakness of the model but a challenge to its central causal claim, since TPB positions intention as the immediate and primary determinant of behaviour whilst offering comparatively little explanatory account of why this translation so frequently fails. Sniehotta, Penseau, and Araújo-Soares (2014) advanced this critique further, arguing that TPB's continued dominance in health behaviour research has arguably slowed, rather than accelerated, the development of more

mechanistically informed intervention design, given the model's limited attention to the enactment, maintenance, and automaticity of behaviour once formed as an intention. TPB's predictive validity has also been questioned in applied and operational settings specifically, where the assumption of a rational, deliberative decision-making process may not adequately reflect the conditions under which health-related decisions are made. Godin and Kok (1996) noted that TPB-based interventions, whilst effective in accounting for behavioural intention, are considerably less effective in predicting actual behaviour where circumstances constrain volitional control, a condition arguably characteristic of a deployed military population operating within a highly structured, resource-constrained, and hierarchical environment. This raises a broader conceptual issue for the present research: TPB assumes that perceived behavioural control is a reasonable proxy for actual control, yet in an environment where behaviour is substantially shaped by command structure, equipment provision, and operational necessity, this assumption is difficult to sustain, and its adequacy as an explanatory framework for this population warrants scrutiny.

These limitations are of particular relevance to this research, which investigates the extent to which a pre-deployment health brief translates into behaviour change amongst British military personnel. Given the well-documented gap between intention and behaviour, and the constraints TPB places on accounting for environmental and situational determinants of action, TPB alone may offer only a partial account of any disparity this research identifies between personnel's attitudes toward health advice and their subsequent behaviour. This limitation informs the consideration, later in this thesis, of the Capability, Opportunity, Motivation-Behaviour (COM-B) model, situated within the Behaviour Change Wheel (BCW), which extends beyond TPB's largely cognitive-motivational focus by explicitly incorporating capability and opportunity as determinants of behaviour in their own right (Michie, van Stralen and West, 2011). Where TPB frames behavioural shortfall primarily in motivational or attitudinal terms, COM-B allows for this to be considered through the additional lenses of capability and opportunity, offering a potentially more actionable framework from which to design future pre-deployment health interventions. TPB is retained here as a foundational

theory of behaviour and as a point of critical comparison, against which the explanatory value of COM-B is later considered.

Social Cognitive Theory (SCT)

SCT emphasises the interaction between personal, environmental, and behavioural factors in determining behaviour. Key components include self-efficacy, observational learning, and reinforcement. SCT is commonly used in interventions promoting physical activity and disease prevention (Bandura, 2004).

Nudge Theory

Nudge theory focuses on subtly influencing decisions and behaviours through environmental cues or “nudges” without restricting freedom of choice. Nudges include default options, visual prompts, or incentives. Nudge theory is used in dietary interventions, organ donation systems, and vaccination campaigns (Thaler & Sunstein, 2008).

2.1.4 Health Intervention Frameworks

Health intervention frameworks are essential for creating, executing, and assessing programs designed to improve health outcomes. Over the years, several frameworks have been developed, each with its strengths and limitations, making them suitable for different contexts and challenges.

PRECEDE–PROCEED

The PRECEDE–PROCEED framework is one of the earliest and most well-established frameworks, emphasising planning and evaluation through community involvement (Green, 2005). This model ensures that interventions address local needs and priorities by engaging communities in the process. However, it may not be ideal in situations where direct community participation is not feasible, such as in military or highly structured environments (Porter, 2015). Despite this limitation, the model has been widely used in health promotion efforts, including smoking cessation and encouraging physical activity (Glanz et al., 2008). Prestwich et al. (2018) introduced a framework designed to refine and improve interventions through an iterative process. Unlike PRECEDE–PROCEED, this approach focuses on

enhancing both the intervention itself and the theories underpinning it. Its cyclical nature makes it especially valuable in situations where flexibility and rapid adjustments are required, such as digital health programs aiming to boost user engagement. This model is particularly appealing for its adaptability and efficiency in contexts where time and resources are limited.

WHO's International Classification of Health Interventions (ICHI)

The ICHI framework, developed by the World Health Organisation, offers a standardised system for categorising and analysing health interventions. It organises interventions around three main axes: Target (what is being acted upon), Action (what is being done), and Means (how it is being done). This structure makes documenting and comparing interventions across different regions and health systems easier. While still in development, ICHI can potentially enhance global public health efforts, such as tracking vaccination coverage or addressing maternal health challenges (WHO, 2023).

Intervention Mapping (IM)

IM provides a structured, step-by-step process for planning health interventions, combining theory, evidence, and stakeholder input at every stage (Bartholomew et al., 2016). Its ecological approach ensures that interventions address multiple levels, from individual behaviours to community and environmental factors. IM has proven effective in diverse areas, including childhood obesity prevention and HIV interventions, showcasing its versatility. However, its detailed methodology can be time-intensive, making it best suited for settings where sufficient resources and expertise are available (Bartholomew, 2011).

Each of these frameworks offers valuable insights and tools for developing impactful health interventions. Choosing the right one depends on the specific goals, resources, and context of the intervention.

2.1.5 Health Behaviour Models

Health behaviour models focus on the health-related behaviours of interest. They provide guidance for designing and evaluating interventions aimed at promoting healthier lifestyles or managing specific health challenges. The Behavioural Change Wheel includes 19 other capability models. Those models with factors that are most relevant to this research will be discussed now.

Health Belief Model (HBM)

The HBM suggests that health behaviours are influenced by individual perceptions of a health threat and the perceived benefits and barriers to taking action. Key constructs include: Perceived Susceptibility: Belief about the likelihood of experiencing a health issue, Perceived Severity: Belief about the seriousness of the health issue, Perceived Benefits: Belief in the efficacy of the recommended action and Perceived Barriers: Perception of obstacles to performing the action (Champion & Skinner, 2008).

This model is ideal for use in interventions targeting behaviours such as vaccination uptake and chronic disease management.

Transtheoretical Model (TTM)/Stages of Change

The TTM describes behaviour change as a process that occurs in stages:

1. Precontemplation: No intention to change behaviour.
2. Contemplation: Considering a change.
3. Preparation: Planning and taking small steps toward change.
4. Action: Actively engaging in the new behaviour.
5. Maintenance: Sustaining the behaviour over time.

(Prochaska & DiClemente, 1983)

It is used for interventions in smoking cessation, substance abuse, and weight management.

Capability, Opportunity, Motivation-Behaviour (COM-B) Model

The COM-B model offers a practical and structured way to influence behaviour change in healthcare. It focuses on three key components: Capability (the physical and psychological ability to perform a behaviour), Opportunity (the external factors that enable the behaviour), and Motivation (the internal and external drivers behind decision-making) (Michie et al,

2011). As part of the Behaviour Change Wheel, it has proven to be a flexible and effective tool for creating interventions in various settings, from healthcare to workplace improvement (Cane et al, 2012).

The strengths of the COM-B model include its simplicity and clarity, which makes it easy for practitioners and stakeholders to understand and apply (Cane et al, 2015). This accessibility has made it particularly effective in collaborative projects that bring together professionals from different disciplines, such as designing smoking cessation programs (Atkins et al., 2017) or encouraging healthier eating habits (Michie et al., 2017).

Another strength lies in the model's holistic approach. By addressing a broad range of factors that influence behaviour, it ensures that interventions are thorough and well-rounded. For example, a study on promoting physical activity used the COM-B framework to build motivation through social support while simultaneously enhancing opportunity by improving access to exercise facilities (Atkins et al., 2017). This dual focus on internal and external factors makes the model versatile for tackling diverse behavioural challenges.

Despite its strengths, the COM-B model has been criticised for oversimplifying behaviour change. Pawson (2015) argues that breaking down behaviour into just three categories can miss the complex interactions that occur in real-life situations. This is particularly evident in issues like obesity, where socio-economic and environmental factors play a significant role (Green, 2014). The model has also been critiqued for its focus on individual-level factors, which can overshadow structural issues such as policy or systemic barriers (Ogden, 2016).

For instance, an intervention designed to improve hand hygiene in low-resource settings might fail if it doesn't adequately address the lack of clean water or sanitation facilities.

Cultural considerations present another limitation. Rogers et al. (2019) point out that the COM-B model assumes universal applicability, which may not always hold true. For example, a vaccination campaign using this model in rural areas might overlook deeply rooted cultural beliefs that shape attitudes toward healthcare. In such cases, significant adaptations would be required to make the framework effective. For instance, the COM-B model might need to be adjusted to account for these beliefs by involving community leaders

or trusted figures in the vaccination campaign. These local leaders could help bridge the gap between health messages and cultural norms. The intervention could also modify motivation by emphasising the respect for traditions while providing information about the benefits of vaccination in ways that make sense to the community. This could involve using culturally relevant communication methods like storytelling or community meetings, helping to build trust and a sense of ownership over the health message. By making these adaptations, the intervention would be better suited to the unique needs of the rural community, helping to overcome cultural barriers and improve the effectiveness of the vaccination campaign.

Implementing the COM-B model can also be demanding in terms of time, effort, and resources. Identifying and addressing all relevant factors within Capability, Opportunity, and Motivation often requires extensive research and planning (Kok et al, 2016). However, these challenges can be mitigated by prioritising the most impactful factors or using technology, such as apps, to streamline data collection and intervention delivery (Michie et al, 2017).

Despite its limitations, the COM-B model remains a valuable tool for designing effective behaviour change interventions. Its adaptability and evidence-based approach make it suitable for a wide range of contexts. That said, practitioners need to be mindful of its resource demands and ensure cultural and contextual adaptations are made when necessary. Integrating insights from other behavioural theories, like the Health Belief Model, can further strengthen its application and address its limitations, making it even more impactful in practice. A military example of using the COM-B with HBM model can be given using an intervention to improve soldiers' physical fitness. The goal is to get the soldiers more active and ready. Still, there are challenges, like a lack of motivation or limited opportunities to exercise, especially during tough or busy times like deployments.

To make the COM-B model work even better, insights from the HBM can be added when using a military fitness program as the example. The COM-B model works on capability, like improving soldiers' physical skills through structured workouts, but if soldiers don't believe they can get fitter or stay in shape, they might not even try. By bringing in self-efficacy from HBM, we can give them confidence. For instance, setting small, achievable fitness goals and

showing steady progress, (like tracking run times or lifting weights), can make them feel proud of their progress. When soldiers see they're improving, they're more likely to believe they can keep getting fitter and more capable. The opportunity part of COM-B looks at making sure soldiers have the time, space, and equipment to work out, but often, the perceived barriers (from HBM) are the real challenges: "I don't have time," "The gym's too far," or "I don't know how to train effectively." So, the program could address these by making fitness programs more accessible. For instance, if soldiers are stationed in a remote location with no gym, the military could provide portable workout kits or online workout programs. The COM-B model looks at motivation by pointing out the benefits of fitness such as better performance on missions and better health overall, but adding perceived susceptibility from the HBM would help soldiers realise that being unfit can increase their risk of injury or make them less effective in combat. An intervention could show real-life stories of soldiers who got hurt or struggled in missions because they weren't fit enough. This makes the risk more real and personal, helping them see why staying fit matters.

By combining COM-B's focus on capability, opportunity and motivation, with HBM's focus on susceptibility, self-efficacy, and barriers, the program gets more tailored to the soldiers' needs. Soldiers can see why fitness matters, feel more confident about their ability to stay fit, and have fewer barriers preventing them from working out, whether they're in the field or on base. It makes the whole thing more personal, practical, and motivating, leading to a stronger culture of fitness and better overall performance.

[Diffusion of Innovations Model](#)

This model explains how new ideas, behaviours, or technologies spread through populations. It identifies five adopter categories: innovators, early adopters, early majority, late majority, and laggards. Key factors influencing adoption include relative advantage, compatibility, and complexity. It is widely used to implement public health innovations, such as new medical technologies or practices (Rogers, 2003).

[Ecological Models](#)

Ecological models emphasize the interplay between individual, interpersonal, organisational, community, and policy-level factors that influence health behaviour (Sallis et al, 2015).

Interventions target multiple levels to maximize effectiveness. This model is used in public health campaigns addressing obesity, physical activity, and smoking cessation.

These models offer varied perspectives on health behaviour, allowing practitioners to design interventions tailored to the specific needs of their target audience and context.

Table 2 sets out theories, frameworks and behaviour change models as discussed above.

Table 2: Behaviour Change theories, frameworks and behaviour change models.

Theories, Frameworks & Models	Description
1. Theory of Planned Behaviour (TPB):	Suggests that behavioural intentions are influenced by attitudes, subjective norms, and perceived behavioural control.
2. Social Cognitive Theory (SCT):	Focuses on self-efficacy and learning through observation
3. Nudge Theory	Encourages subtle changes in the environment to prompt behavioural changes without restricting choice.
4. PRECEDE–PROCEED	Ensures that interventions address local needs and priorities by engaging communities in the process
5. Intervention Mapping:	A systematic approach to developing health promotion interventions based on theory and evidence.
6. Health Belief Model (HBM):	This model emphasises that behaviour change depends on an individual's perceived susceptibility, severity, benefits, and barriers.
7. Stages of Change Model (Transtheoretical Model):	Proposes that people go through various stages (precontemplation, contemplation,

	preparation, action, and maintenance) in changing behaviour.
8. COM-B Behaviour Change Wheel:	According to the COM-B framework, this model maps out intervention strategies (education, training, environmental restructuring).

2.1.6 Health Information Delivery.

The delivery method of health information significantly impacts how well participants engage with, understand and act on that information (Michie, 2011). Nutbeam (2008) emphasised that health literacy (how well someone understands and uses health information) is crucial for turning knowledge into action. A military health intervention that involved investigating the Knowledge, Attitudes and Practices (KAP) of the Chinese Navy concluded that the military participants awareness of preventive and first-aid measures against heat-related illnesses need to be strengthened (Wang, 2021). The authors recommend developing educational programmes and resources to raise this awareness.

This section of the literature review therefore examines key factors in health intervention delivery, including modes of delivery, contextual considerations and future aspirations for improving these health interventions.

In the military, health interventions are often delivered through didactic, lecture-based formats. These approaches are efficient for delivering the information to a large number of military personnel prior to a deployment, and also a time-efficient way of delivering standardised information. However, they often lack interactivity and engagement, which can lead to reduced retention and application of knowledge (Freeman et al, 2014). Studies have shown that passive learning methods, such as presentations, are less effective in eliciting behavioural change compared to active learning methods (Freeth et al., 2002). This type of passive format is often perceived as a 'tick-box exercise' failing to address the unique and

context-specific risks participants face (Michie et al., 2011). Freeth et al. (2002) highlighted that active interprofessional education methods incorporate active learning, improved knowledge retention and application compared to passive, lecture-based formats. For example, Salas et al. (2008) demonstrated that simulation-based training in healthcare improved attention, engagement, and practical skills by immersing participants in realistic scenarios. Importantly, health care workers in this study were able to make mistakes before interacting with an actual patient (Salas et al, 2008). The research suggests that simulation-based training can be effective in improving patient safety when it is designed and delivered appropriately, however it must be noted that it is just one of many tools that could be used as part of training programme.

Interactive methods, such as scenario-based training and role-playing have been shown to enhance engagement and knowledge retention. For example, in military context, a simple handwashing demonstration might resonate more with participants than seeing a slide deck on hygiene. These approaches provide participants with opportunities to practice applying information in real-life contexts, thereby bridging the gap between knowledge and behaviour (Salas et al., 2008).

In disaster preparedness training, simulations of emergency scenarios increased participants' ability to recall and apply knowledge under stress (Dieckmann et al., 2009). Similarly, scenario-based health interventions, particularly in military settings, have been shown to improve decision-making skills and preparedness by contextualising information in operational environments (Sniehotta et al., 2014). Active learning approaches, such as problem-solving exercises or Q&A sessions, deepen understanding by encouraging critical thinking (Freeth et al. 2002).

Digital platforms, including apps, online modules, and Extended Reality (XR) including Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality, have emerged as innovative tools for delivering health interventions. These methods offer flexibility, scalability, and personalisation, making them effective for diver populations. Studies have demonstrated that mobile health (mHealth) applications can improve accessibility and adherence to health

interventions, particularly when combined with gamification or reminders (Free et al., 2013). For example, apps designed to promote physical activity and healthy eating have shown significant success in improving lifestyle behaviours (Michie et al., 2017). However, the effectiveness of digital interventions depends on factors such as user interface design, access to technology, and participant motivation and user familiarity (Free et al., 2013). In military contexts, limited internet connectivity on overseas operational tours and strict guidelines regarding the use of personal devices for official purposes (Ministry of Defence's Joint Service Publication (JSP) 740, 2025) makes using work-related apps on personal device not feasible.

Health interventions work best when made specific to the unique needs, preferences, and characteristics of the target audience. Military interventions must account for unique challenges like hierarchical structures, varying levels of education, and operational demands placed on participants.

The timing of health intervention delivery plays a critical role in its effectiveness. Research suggests that interventions are more impactful when delivered close to the point of need, such as immediately before or during deployment, rather than months in advance (Sniehotta, Presseau & Araújo-Soares, 2014). Providing location-specific information at relevant times enhances the perceived utility of the intervention (Sniehotta, Presseau & Araújo-Soares, 2014).

Barriers such as information overload, cultural resistance, or logistical constraints can hinder the success of health interventions (Betancourt et al, 2003). To address the barriers concise, focused content and multi-modal delivery can mitigate these challenges. For example, combining short briefings with supplementary handouts or digital resources has been shown to enhance retention without increasing session duration (Michie et al., 2017). A review by Champion and Skinner (2008) on the Health Belief Model (HBM) found that interventions emphasising both perceived risks and actionable steps (using visuals and verbal cues) were more effective in driving health behaviours. Participants may disengage or misunderstand

health information if the delivery method does not align with their cultural norms or educational background (Betancourt et al, 2003).

Despite advances in health intervention delivery, several gaps remain in understanding how best deliver health interventions. There is limited research on the long-term impact of intervention delivery methods on sustained behaviour change (Mönninghoff et al., 2021; Zhou et al., 2026). Whilst intervention delivery methods have received considerable attention across the wider health behaviour change literature, evidence regarding their long-term effectiveness remains comparatively limited. Mönninghoff et al. (2021), in a systematic review and meta-analysis of randomised controlled trials, found that mHealth physical activity interventions demonstrated only modest evidence of sustained effect once follow-up extended beyond the immediate post-intervention period, with effect sizes generally diminishing over time. A more recent systematic review by Zhou et al. (2026) examining digital health interventions targeting lifestyle behaviours similarly concluded that, whilst such interventions show clear potential for producing short-term behavioural change, evidence of their long-term effectiveness remains limited. Taken together, these findings suggest that the gap between short-term efficacy and sustained, long-term behaviour change identified over a decade ago has not been meaningfully closed and continues to represent a significant limitation across the digital and technology-delivered intervention literature more broadly. Additionally, emerging technologies like XR and Artificial Intelligence (AI) hold promise for personalising health interventions, but their full potential remains unexplored, particularly in the military due to funding constraints. More research is needed to adapt behavioural science models to unique environments, such as military or humanitarian contexts to optimise health intervention delivery.

Having the right person imparting a health message, such as how to keep yourself DNBI free on an operational tour, requires a practitioner to be able to effectively communicate with a group or individual service person. A crucial part of behavioural science is to be able to communicate the health message and therefore identify what the barriers before it is possible to create a health intervention prior to deployment. Corcoran (2007) explained that:

The communication process is a multi-dimensional transaction influenced by a variety of factors.

Table 3 presents the pros and cons of current delivery methods discussed above.

Table 3: Comparison of Health Intervention Delivery Methods.

Delivery Method	Positives	Negatives	References
Didactic (Lecture-Based/ Power Point Presentation)	1. Can deliver a standardised brief to large groups. 2. Time-efficient and cost-effective. 3. Military personnel are used to this format. 4. Military camps have the facilities for this.	1. The participants are passive, which leads to a reduced attention span, leading to retention. 2. Often perceived as a “tick-box exercise,” which is not specific and personal 3. May not result in long term behaviour change.	Freeth et al. (2002); Michie et al. (2011)
Scenario-Based Learning	1. Participants can interact meaning they are more engaged which helps with knowledge retention. 2. Participants can show their knowledge to make their own decisions. 3. Can be good for demonstrating practical skills under life-like conditions.	1. Take a lot of time to design and implement a scenario. 2. The instructors must have the right KSE to facilitate the scenarios in role-playing. 3. Not ideal to use in a big group or where the venue does not support this type of learning.	Salas et al. (2008); Sniehotta et al. (2014)
Digital Platforms	1. These can be accessed at suitable times for whole populations. 2. Feedback and results can be given immediately to the participant. 3. This can link with other digital platforms like	1. There must be access to technology to support the programme, which may be limited in operational theatres. 2. Participants must be used to this form of technology.	Free et al. (2013); Michie et al. (2017)

	gamification, videos, or interactive content.	3. Participants may not want to use their personal devices for work-related purposes, particularly in a military context.	
Printed Materials	1. These are easy to provide to participants and more cost-effective as additional health information. 2. The document can be retained so is useful to refer to.	1. Participants may not read the document, and it can be seen as outdated in this digital age. 2. There is no opportunity to provide feedback and no interaction with the author of the document if clarity is needed. 3. This option is also not good for the environment.	Champion & Skinner (2008); Nutbeam (2008)
One-on-One Counselling	1. Participants get a highly personal experience tailored to their individual needs. 2. This encourages trust and deeper understanding of the health information being provided. 3. Participants have the opportunity to ask questions.	1. This is very logistically and resource-intensive; requiring significant time and qualified personnel. 2. This would not be possible for a large amount of military personnel on PDT. 3. There may not be a suitable venue for the confidentiality this would require.	Michie et al. (2011); Nutbeam (2008)
Group Discussions	1. This promotes participants learning from each other and sharing their experiences. 2. It is good at providing internal social support networks which could improve motivation.	1. More dominance participants may get more from group discussions so this may limit inclusivity. 2. Being unstructured there is a risk of not covering all the health information topics needed.	Bandura (1986); Freeth et al. (2002)

2.1.7 Behaviour and Attitudes.

Understanding the difference between attitudes and behaviours is important in this thesis to enable segregation of the participants views of the health brief. Attitudes are the evaluations and feelings individuals hold toward specific objects, issues, or people, while behaviours are the actual actions taken in response to those attitudes (Conner et al., 2021).

Behavioural science examines how individuals make decisions and act, focusing on habits, motivation, and external constraints (Thaler & Sunstein, 2008). Behavioural nudges can influence decision-making and action (Thaler & Sunstein, 2008). In health, the aim is to improve health at an individual and population/societal level (Michie, 2011). There are four domains of public health practice which are: Health Improvement, Health Protection, Health Systems and Health Intelligence. Behaviour change has been linked to health improvement, but it can relate to all four domains of public health. For example, if you are trying to reduce inappropriate antibiotic use in Health Protection or trying to improve personal self-care in the case of health services, understanding behavioural change is vital in any role in public health practice.

The World Health Organization (1998) defines health behaviour as any activity undertaken by an individual regardless of actual or perceived health status, for the purpose of promoting, protecting and maintaining health. Gochman identifies that personal attributes such as beliefs, expectations, motivations, values, perceptions and other cognitive elements underpin health behaviour (Gochman, 2018).

Cognitive dissonance is a phenomenon in which a person experiences psychological distress due to conflicting thoughts or beliefs (Cooper, 2007). Military personnel are very much linked to the beliefs that have been instilled in them through basic training and the British military values and standards (Wakin, 2008). These values, courage, discipline, respect for others, integrity, loyalty, and selfless commitment, form the foundation of military conduct and are reinforced through daily practices and Chain of Command expectations

(King, 2013). These are more than rules that are followed by soldiers; they underpin their way of life and are standards that are followed, akin to a religion (Wakin, 2008). The relevance to this research is that health professionals must be cognisant of these deep-rooted beliefs and address them when designing health interventions.

Dissonance is likely to arise where health advice conflicts with these values rather than aligning with them. Advice emphasising rest, caution, or self-protection can sit uneasily alongside values such as courage and selfless commitment, which prize endurance and stoicism over self-preservation. Where health advice appears to run counter to a deeply held military identity, dissonance theory predicts the discomfort will be resolved in one of two ways: either behaviour changes to accommodate the advice, or the advice is minimised or dismissed to protect the more deeply held belief (Festinger, 1957). The second pathway is the greater concern for intervention design. It suggests health messaging can be rejected not because it lacks information, but because rejecting it is the more comfortable option.

This has several practical implications for designing health interventions in a military population. The messenger matters: advice from a respected member of the Chain of Command is likely to be received differently to the same advice from an unfamiliar civilian health professional, as the former signals alignment with military values rather than opposition to them. Framing also matters. Advice framed around individual vulnerability risks clashing with values of courage and selfless commitment, whereas the same advice framed around operational effectiveness and protecting the wider unit is more likely to be accepted without triggering dissonance. Stigma is a related barrier; UK research has identified stigma as a significant obstacle to help-seeking amongst Armed Forces personnel, particularly where disclosing a health concern may be seen as a sign of weakness or a threat to occupational standing (Iversen et al., 2011). Timing also plays a part: a generic, one-off health brief disconnected from the operational context is more easily dismissed than advice built into training personnel already see as relevant to their role.

Taken together, these points suggest the effectiveness of a health intervention in a military population depends less on the accuracy of its content and more on whether it is designed

and delivered in a way that fits the belief system personnel have already been socialised into. Where that alignment is missing, dissonance theory suggests personnel are more likely to discount the advice than change their behaviour.

The theory of persuasion suggests that military personnel might be influenced by the characteristics of the speaker, leading to a temporary or surface shift in attitude (Petty & Cacioppo, 1986). Messages that are thought-provoking and that appeal to logic are more likely to lead to permanent changes in attitudes

Michie and Abraham (2018) carried out a critical review to assess whether evaluation studies can answer four key questions about behaviour change interventions: 'Do they work? how well do they work?, how do they work? and why don't people follow instructions, like take the medication they have been recommended?'

This thesis aims to explore and differentiate between the military personnel's attitudes towards the health brief and their behaviour, specifically if the health brief caused them to change their health behaviour. It is therefore important to provide a definition and to explain the distinctions between attitudes and behaviours in the context of this study.

2.1.8 Risk-Taking, Culture and Personality Factors

When considering the impact of culture on military personnel, it is crucial to recognise that individuals who join the military come from diverse civilian backgrounds, with various personal values and beliefs shaped by their civilian life. However, once recruited, military personnel undergo intensive training and socialisation processes to indoctrinate them and their values, behaviours, and attitudes, shaping them into a cohesive and functional unit. As a result, military personnel adopt a distinct set of values and behaviours that are aligned with the specific needs and objectives of the military institution. The British Army, for instance, promotes a set of six core 'Values' that include courage, discipline, respect for others, integrity, loyalty, and selfless commitment. These values form the foundation of a soldier's conduct and are instilled in recruits from the moment they join (British Army website, no

date). Through military training, these values are not only taught but reinforced through daily practices, group activities, and the expectations of the Chain of Command. In this way, military personnel are socialised into a culture that prioritises the collective over the individual. Alongside these values, the British Army also sets out clear 'Standards' of behaviour, emphasising that actions should be lawful, appropriate, and totally professional. These standards are essential in ensuring that military personnel operate within the boundaries of the law and military regulations, while maintaining high ethical standards (British Army, no date). This focus on professionalism and conduct permeates all aspects of military life, from personal behaviour to interactions with colleagues, and is integral to the successful functioning of the British Army. Given this context, it is essential to consider how such a distinct military culture could influence military personnel's attitudes toward health interventions. Research suggests that military personnel are often conditioned to respond to authority figures and are highly accustomed to following structured instructions (Gibson, 2014). This can have both positive and negative implications for health interventions. On the one hand, clear, authoritative communication about health risks and behaviours may encourage compliance. On the other hand, if health messages are not perceived as relevant or aligned with military priorities, military personnel may show resistance or disengagement. For instance, interventions that do not resonate with the specific operational environment of military personnel, such as their deployment context or mission focus, may struggle to gain traction (Parsons & Keegan, 2017). Furthermore, the notion of "professionalism" within the military could also impact the acceptance of health interventions. Military personnel may feel that their physical well-being is an intrinsic part of their role, with health-related behaviours being seen as a duty rather than a personal choice (Perry et al., 2015). Therefore, health interventions that highlight the importance of maintaining peak physical fitness and mental well-being may be more easily embraced if framed as essential to their professional role and readiness.

The culture of the military, with its emphasis on values such as discipline and integrity, alongside the high standards of behaviour expected from personnel, can indeed influence

their response to risk taking behaviours. These values and standards shape how military personnel view their roles, including their physical and mental health. Thus, they can determine the success or failure of health-related messages (such as risk reduction strategies) aimed at this cohort.

Following on from a distinct culture, research has extensively examined how various personality traits also influence risk-taking behaviours (Zuckerman, 2007). The leading five personality traits are extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness, which have been mainly studied in the context of risk-taking (McCrae & Costa, 2004). In the military context, personality traits are often linked to risk-taking behaviours, which can have significant implications for decision-making, leadership, and mission outcomes (Seligman, 2008). Research has explored how traits like extraversion, neuroticism, openness to experience, and conscientiousness relate to how military personnel approach risk in combat, training, and other high-stakes environments (Lee & Ashton, 2004). Military personnel high in extraversion may be more inclined toward risk-taking behaviours. This trait is often associated with a willingness to take action, seek excitement, and embrace challenges, which can be crucial in high-pressure situations like combat or tactical operations (Robinson, 2012). Extraverted soldiers might be more likely to volunteer for dangerous missions or make bold decisions under pressure (Matthews et al., 2000). However, this trait can be double-edged; while it may drive proactive and decisive actions, it could also lead to impulsive decisions that ignore potential dangers (Zuckerman, 2007).

On the other hand, soldiers high in neuroticism (which relates to emotional instability) may approach risk with more caution. High neuroticism is often linked to anxiety, stress, and a fear of adverse outcomes, which could make soldiers more risk-averse (Eysenck, 2012). In military settings, this could mean they are less likely to engage in risky behaviours or follow through with risky orders without careful consideration (Costa & McCrae, 1992). While this can lead to more conservative decision-making, excessive anxiety may hinder quick and decisive action when it's needed most (Matthews et al., 2000).

Openness to experience, which is characterised by curiosity and a willingness to consider novel ideas, can influence how soldiers' approach new tactics, technologies, or environments. In the military, this trait may encourage soldiers to experiment with new strategies or adapt to unfamiliar and high-risk scenarios (McCrae & Costa, 2004). For example, soldiers with higher openness might embrace unconventional tactics in unconventional warfare, which could be a critical advantage in asymmetrical or guerrilla warfare situations (Matthews et al., 2000).

Conscientiousness, which refers to self-discipline, careful planning, and adherence to rules, may influence how military personnel assess and mitigate risks (Robinson, 2012). High conscientiousness can result in a more methodical approach to risk, where soldiers focus on planning, preparation, and adherence to protocols to avoid unnecessary danger. This can be especially important in the military, where effective risk management can determine the success or failure of a mission (Costa & McCrae, 1992).

The Dark Triad of personality traits—narcissism, Machiavellianism, and psychopathy—has also been linked to risk-taking behaviours, especially in leadership roles (Paulhus & Williams, 2002). Military leaders exhibiting higher levels of these traits might be more likely to take risks that enhance their status or power, sometimes at the expense of their subordinates' safety or well-being (Jonason et al., 2012). While a degree of risk-taking may be necessary in leadership, an overemphasis on self-interest or a lack of empathy for others could lead to poor decision-making and adverse outcomes for the unit (Babiak & Hare, 2006). In the military, personality traits are crucial in shaping how personnel assess and engage in risk-taking. Extraverts may thrive in high-risk, high-reward situations, while those high in neuroticism may be more cautious. Openness encourages adaptive thinking in dynamic environments, and conscientiousness leads to careful risk management.

Considering all the above factors, the type of person that would consider a career in the military according to the findings from a large longitudinal sample of German males are those lower in agreeableness, neuroticism, and openness to experience (Jackson, 2012).

Créach et al (2016) categorised the French military personnel studied into *those who seek*

risks and those who are health-conscious” (Créach et al, 2016). This study aims to determine what percentage of the military personnel took a risk and in which area of health (i.e. sanitation (hand washing) etc).

Understanding these personality traits can help military leaders assign roles, predict behaviour under pressure, and (of relevance to this thesis) tailor training (Lee & Ashton, 2004).

Due to US military personnel accessing service in the civilian sector, the US produced a white paper (Understanding the Military: The Institution, the Culture and the People, 2010) to provide information for Behavioural Healthcare Specialists working with Veterans and Service Members to address this. This indicates that Military personnel are categorised as having distinct cultural elements from their civilian counterpart.

Exploring risk-taking tendencies within this military cohort is valuable as it provides insight into how military personnel balance their actions' potential benefits and dangers. We can better understand how they make decisions by examining personality traits, cognitive processes, and social influences on risk-taking. This understanding is crucial for improving training programs, designing effective interventions, and enhancing adherence to beneficial health behaviours. There is no single accepted definition of risk (Berry, 2004; Joffe, 2003) as it can include different behaviours which could constitute a risk in one group but not another (Berry, 2004). There is an extensive body of research on how personality factors influence or affect risk behaviours, particularly regarding health-related issues, including risky health behaviours (Caspi et al., 1997; Cooper, Wood, Orcutt & Albino, 2003; Vavrik, 1997; Voigt et al., 2009; Vollrath, Knoch & Cassano, 1997).

The sensation seeking (SS) personality is defined as: “The seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experiences” (Zuckerman, 1994, p. 27). Significantly, military activity is about confronting risk and managing it. It is emphatically never about avoiding risk; the military profession is not one for those risk averse” (British Defence Doctrine, 2001, pp. 3-4).

“Soldiering is not a risk-free business; it never can be” (General (retired) Sir Mike Jackson) inherently involve higher levels of risk, i.e., it is the nature of the job. This has been tacitly endorsed in numerous papers (Glicksohn & Bozna, 2000; Kemsley, Slavin & Bridger, 1999; Maguen et al., 2008; Sicard, Jouve & Blin, 2001). Further to this, it has been suggested that those who join the military may be higher on the risk tolerance curve (Fear et al., 2008; Hooper et al., 2006), especially those who join to undertake combat roles (e. g. infantry) or who join specialist combat units (e. g. special forces, bomb disposal, underwater diving). The reason military personnel take risky behaviour is varied and complicated. It could be peer pressure, especially in this cohort, who have a teamwork drilled into them from basic training onwards. It could also be linked to a form of relaxation especially on an operational tour where there is little or no other release.

Thandi, Sundin and Dandeker (2015) explored the impact of deployment on risk-taking behaviours among reservists and found that deployment was significantly associated with risky driving, smoking and physical violence. This implies that the cohort in my study are more likely to take risk with their health whilst deployed compared to someone who does not deploy. The health brief is given to both regular and reservist military personnel and does not distinguish between them.

2.1.9 Summary of key findings and insights from the literature review.

The literature review explored the prevalence and impact of Disease Non-Battle Injury (DNBI), military training initiatives, and the role of behaviour change theories in military health interventions and risk taking. The key findings indicate that DNBI remains a persistent challenge in military operations, and current health interventions, particularly PDT health briefs, may not be effectively influencing long-term health behaviours.

[Disease Non-Battle Injury \(DNBI\) and Its Impact on Military Operations](#)

DNBI accounts for a significant proportion of military casualties, often exceeding those caused by direct combat (Withers, 1999; Sartin, 1993). These injuries and illnesses, including infectious diseases, heat-related conditions, and musculoskeletal injuries,

significantly reduce operational effectiveness (Murray & Yun, 2016). Despite improvements in medical countermeasures, DNBI rates remain high, with recent operational reports estimating a 30% DNBI rate among deployed forces (Kauvar, 2020).

Effectiveness of Pre-Deployment Training (PDT) Health Briefs

PDT health briefs are mandated for all military personnel before deployment, providing medical, environmental, and preventive health guidance (Bricknell & Moore, 2007).

However, these sessions are delivered primarily in lecture-based formats, which research suggests lack engagement and fail to influence long-term behaviour (Michie et al., 2011).

The timing of health brief delivery is also a critical factor in its effectiveness. For example, Operation RUMAN, a rapid-response humanitarian mission, faced suboptimal Force Health Protection preparations, indicating that flexibility in PDT health brief delivery is required for different operational contexts (MacMahon, 2019).

Health Interventions in the Military

Studies suggest that military personnel often fail to adhere to recommended health precautions, even when explicitly briefed. For example, research on insect bite prevention among Canadian military personnel in Kabul found that only 11% used insect repellent despite receiving pre-deployment health information (Crane, 2012). This highlights a gap between knowledge acquisition and behavioural adherence in military health interventions.

Behaviour Change Theories

The Theory of Planned Behaviour (TPB) highlights the importance of attitudes, social norms, and perceived control (Ajzen, 1991; Engelhardt et al., 2023). The Health Belief Model (HBM) suggests that health behaviours are driven by an individual's perceived susceptibility to illness and perceived benefits of preventive action (Champion & Skinner, 2008).

Other frameworks, such as the COM-B Model, highlight the need for interventions to enhance individual capability, increase opportunity, and strengthen motivation to achieve behaviour change (Michie et al., 2011). However, while these models offer valuable insights, their application in military settings requires adaptation to account for unique factors, such as

hierarchical structures, risk-taking cultures, and operational constraints (Atkins et al., 2017; Pawson, 2015).

Challenges in Health Information Delivery

Research suggests that passive learning approaches, such as PowerPoint-based health briefs, result in low knowledge retention and limited impact on health behaviours (Freeth et al., 2002).

Health interventions must also consider cultural and contextual factors, as information overload, lack of relevance, and resistance to change can hinder effectiveness (Betancourt et al., 2003). Military-specific challenges, such as restrictions on mobile technology use (Ministry of Defence, JSP 740), further limit the adoption of innovative digital health training solutions.

Risk-Taking Behaviour and Military Culture

Military personnel exhibit higher levels of risk tolerance due to their training and operational roles (Fear et al., 2008; Hooper et al., 2006). These findings suggest that risk-taking behaviours may influence adherence to PDT health interventions, yet little research has examined this relationship.

2.2 Systematic Narrative Review.

2.2.1 Systematic Narrative Review Methodology.

Whilst PDT health interventions have been delivered over a number of years now as part of standard preparation for personnel deploying overseas, the evidence base underpinning their effectiveness remains sparse, particularly in relation to the specific behavioural barriers and facilitators that determine whether such interventions translate into meaningful behaviour change. A systematic and up-to-date synthesis of evidence is essential to the design of the primary research reported in this thesis, in order to ensure that the mixed methods study which follows was informed by, and positioned in relation to, the most current and methodologically robust evidence available.

This section therefore presents a systematic narrative review undertaken to address the following research question: what factors are reported to be barriers or facilitators of health

behaviour change in military personnel? In addressing this question, the review sought not only to identify the range of factors reported across the existing literature, but also to critically appraise the methodological quality and applicability of this evidence, to establish which findings could be considered reliable, and where genuine gaps in the evidence base remained. A systematic approach was considered the most appropriate means of answering this question, in preference to a traditional narrative review. Traditional narrative reviews, whilst useful for providing broad contextual overviews, are commonly criticised for their susceptibility to selection bias, given the absence of a predefined, transparent, and reproducible search and screening strategy; as a result, they are prone to over-representing readily available or familiar literature at the expense of a comprehensive account of the evidence base (Mulrow, 1994). A systematic review, by contrast, applies an explicit, pre-specified methodology to the identification, screening, appraisal, and synthesis of evidence, thereby reducing the risk of bias and improving the transparency and reproducibility of the review process (Grant and Booth, 2009). Given that this research sought to identify barriers to behaviour change across a body of literature anticipated to be both limited and methodologically heterogeneous, a systematic approach was deemed essential to ensure that the full extent of the relevant evidence base, rather than a partial or unrepresentative subset of it, was captured and critically evaluated. The remainder of this chapter sets out the design, eligibility criteria, search strategy, and analytic approach through which this systematic narrative review was conducted.

2.2.2 Design

A systematic narrative review was used to address the aim of this research. This enables the inclusion of studies which use differing methodologies, designs, and outcome measures, whilst still applying the same rigorous and transparent search, screening, and appraisal processes associated with systematic review methods (Popay et al., 2006; Petticrew and Roberts, 2006). Given that the evidence base relating to health interventions in the military was anticipated to have different methodologies (quantitative, qualitative, and mixed-methods designs), a narrative synthesis was better suited than a statistical synthesis would

have been (Grant and Booth, 2009). Whilst adopting this approach, the review also adhered to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 (Page et al., 2021). PRISMA 2020 provides an evidence-based, minimum set of items for the transparent reporting of systematic reviews and was selected in preference to the original 2009 statement in order to reflect current best practice in search reporting, risk-of-bias assessment, and synthesis methods. This combined approach therefore allowed the different findings across the ten included studies to be critically compared in relation to the review question, whilst maintaining methodological rigour throughout.

2.2.3 Eligibility Criteria.

The review question was developed using the Population, Topic of Interest, Context (PICo) context (with outcome added to further develop the search), which structured both the eligibility criteria and the subsequent search strategy. The population of interest comprised of adults of any gender, of mixed rank and ethnic background, drawn from military personnel, comparable NATO and allied armed forces, and overseas health workers (e.g., non-governmental organisation and Foreign, Commonwealth and Development Office personnel) preparing for overseas deployment. Whilst the primary population of interest for this research was military personnel, overseas health workers were also considered within the scope of the review on the basis that both groups share a common operational context: preparation for, and undertaking of, deployment to overseas, and often austere or high-risk, environments. Health workers deploying alongside or in proximity to military forces are frequently exposed to comparable environmental and occupational health risks, including infectious disease, extreme climate, and limited access to routine healthcare, and are commonly subject to similar pre-deployment health briefings and interventions as military personnel themselves. Including this population therefore broadened the available evidence base relevant to the review question. This was considered particularly relevant given the comparatively limited body of literature evaluating behavioural health interventions within military populations.

The topic of interest was the barriers to behavioural change associated with health interventions, encompassing health knowledge and attitudes towards changing health behaviours. The context was overseas deployment settings. Behavioural change was the outcome measure.

Studies were included where the population consisted of military personnel and overseas health workers. Studies were excluded where the population comprised children, year (studies before 2021 were excluded) and studies where only an abstract was published. No restriction was placed on study design at the point of eligibility screening, in keeping with the breadth of the review question and the anticipated heterogeneity of the available evidence base.

2.2.4 Search Strategy

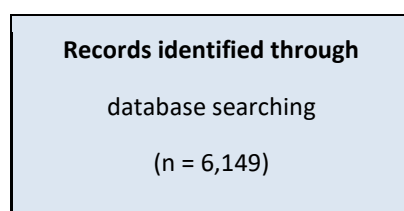
Five electronic databases were searched: PubMed, PsycINFO, CINAHL, Web of Science, and the Cochrane Library. In addition, a hand search was conducted on one relevant key journal (BMJ Military Health). Articles were only included if they were peer reviewed and were reported in English language. The search was limited to literature published between 2021 and 2026, reflecting the intention to capture the most recent evidence on behavioural health interventions in this population. Search terms were derived directly from the PICO elements and combined using Boolean operators (AND/OR) and truncation, and comprised: “health intervention”, “behaviour change”, “risk taking”, and “military personnel”, alongside their synonyms and, where available, relevant subject headings (e.g., MeSH terms in PubMed). Population terms (e.g., adult*, personnel, military personnel) were combined with intervention/topic terms (e.g., health knowledge, health behavio*, risk-taking behavio*) and outcome terms (e.g., DNBI, behaviour change, health outcome*) using the Boolean structure Population AND Intervention AND Outcome, consistent with the PICO search framework outlined above. The full search strategy, including database-specific syntax, is reported in Appendices.

2.2.5 Study Selection.

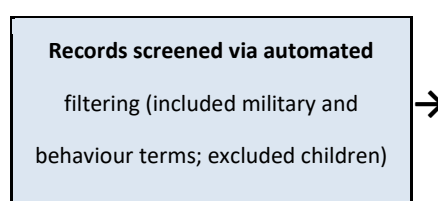
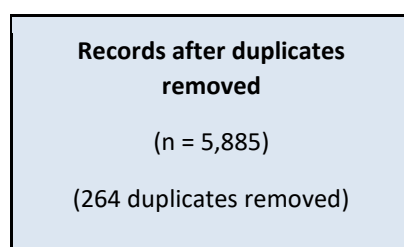
All records identified through the database searches were exported and de-duplicated prior to screening. Screening was conducted using Rayyan, a web-based systematic review screening tool that supports blinded, independent dual review (Ouzzani et al., 2016). Two reviewers independently screened titles and abstracts against the eligibility criteria outlined in section 3.2, followed by independent review of the remaining records. Discrepancies between reviewers were resolved through discussion meetings. Records were excluded at the title/abstract stage where the population did not include a military sample, in line with the PICO criteria; a small number of full-text articles were subsequently excluded on the basis of inappropriate methodology or outcome measures that did not align with the review's eligibility criteria. The complete study selection process is presented as a PRISMA 2020 flow diagram below (Figure [X]), which reports the number of records identified, screened, excluded, and included at each stage, together with reasons for exclusion at the full-text stage.

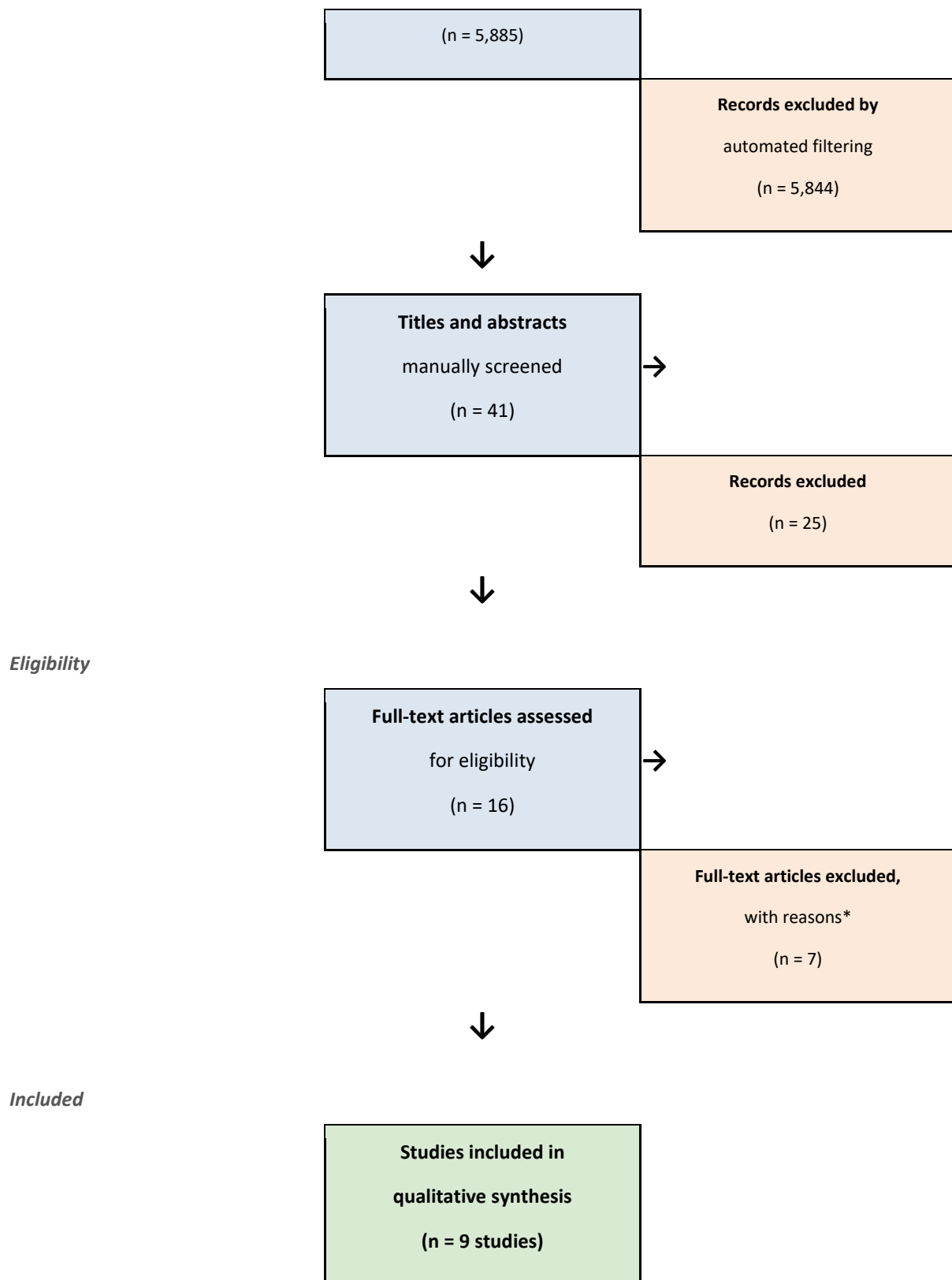
Table 9: PRISMA 2020 flow diagram:

Identification



Screening





** Reasons for full-text exclusion: wrong methodology, n = 1 (letter from Chief Executive); wrong outcome, n = 4 (did not explicitly measure behaviour as an outcome); wrong data collection method, n = 1 (data collected by DoD, not by the study authors); wrong population, n = 1 (no participants were military personnel or overseas health workers).*

2.2.6 Quality Appraisal

The methodological quality of included studies was assessed using the Mixed Methods Assessment Tool (MMAT) (Hong et al., 2018). MMAT is designed for empirical qualitative, quantitative, and mixed methods studies, and its developers explicitly state it is not intended for other document types such as reviews, protocols, or conceptual/discussion papers. Each study first passed two screening questions, then was rated against the 5 criteria for its assigned category (qualitative, quantitative non-randomised, or quantitative descriptive).

Table 10: Quality Appraisal of Included Studies using MMAT (Hong et al., 2018)

Step 1: Screening Questions (all study designs)

Study	S1. Clear research question(s)?	S2. Do collected data address the research question(s)?	Category assigned
Forchuk et al. (2025)	✓	✓	Quantitative descriptive
Pebole et al. (2023)	✓	✓	Quantitative descriptive
Gignoux-Froment et al. (2025)	✓	✓	Quantitative descriptive
Bell et al. (2000)	✓	✓	Quantitative non-randomised
Verrall (2019)	✓	Can't tell	Quantitative non-randomised
Cole et al. (2019)	✓	✓	Quantitative non-randomised
Tynan et al. (2024)	✓	✓	Quantitative descriptive
Rawcliffe et al. (2024)	✓	✓	Quantitative descriptive
Sutton et al. (2023)	✓	✓	Qualitative

✓ = criterion met X = criterion not met "Can't tell" = insufficient reporting to judge

Step 2a: Qualitative Studies

Study	1.1 Qualitative approach appropriate?	1.2 Data collection methods adequate?	1.3 Findings adequately derived from data?	1.4 Interpretation sufficiently substantiated?	1.5 Coherence between sources, collection, analysis, interpretation?
Sutton et al. (2023)	✓	Can't tell	✓	✓	Can't tell

1.2 rated Can't tell: data collection comprised one closed item and two open-ended items in a 12-month follow-up survey — relatively limited depth for qualitative exploration; the authors themselves recommend interviews or diaries in future work.

1.5 rated Can't tell: only 87/579 (15%) of original MAC participants completed the follow-up, and the split between those who returned to duty versus were discharged is unreported, limiting confidence that the coded themes cohere with the full original cohort's experience.

Step 2b: Quantitative Non-Randomised Studies

Study	3.1 Participants representative of target population?	3.2 Measurements appropriate for outcome & exposure?	3.3 Complete outcome data?	3.4 Confounders accounted for?	3.5 Intervention/exposure administered/occurred as intended?
Bell et al. (2000)	✓	✓	✓	✓	✓
Verrall (2019)	Can't tell	✓	X	Can't tell	✓
Cole et al. (2019)	X	✓	X	Can't tell	✓

Verrall (2019) — 3.1 Can't tell: single-brigade sample, representativeness to the wider British Army not established. 3.3 X: sample size fell from n=1,374 (predeployment) to n=537 (postdeployment), a ~61% reduction not explicitly addressed as attrition bias in the reported text. 3.4 Can't tell: age/gender adjustment reported for unit-level ImpSS comparisons, but not clearly for the health-behaviour comparisons themselves.

Cole et al. (2019) — 3.1 X: convenience sample recruited via flyers; only 20% were active-duty service members (remainder retirees/family), limiting representativeness to the active-duty population of primary military interest. 3.3 X: 56% attrition by 10 weeks, explicitly acknowledged by the authors as precluding accurate assessment of long-term effects. 3.4 Can't tell: single-arm pre-post design with no control/comparison group, so regression to the mean or secular trends cannot be ruled out.

Step 2c: Quantitative Descriptive Studies

Study	4.1 Sampling strategy relevant to research question?	4.2 Sample representative of target population?	4.3 Measurements appropriate?	4.4 Risk of nonresponse bias low?	4.5 Statistical analysis appropriate to answer research question?
Forchuk et al. (2025)	✓	Can't tell	✓	X	✓
Pebble et al. (2023)	Can't tell	X	✓	Can't tell	✓
Gignoux-Froment et al. (2025)	✓	Can't tell	Can't tell	X	✓

Study	4.1 Sampling strategy relevant to research question?	4.2 Sample representative of target population?	4.3 Measurements appropriate?	4.4 Risk of nonresponse bias low?	4.5 Statistical analysis appropriate to answer research question?
Tynan et al. (2024)	✓	Can't tell	✓	Can't tell	✓
Rawcliffe et al. (2024)	✓	X	✓	Can't tell	✓

Forchuk et al. (2025) — 4.2 Can't tell: no comparison reported between the achieved sample's demographics and the wider CAF population. 4.4 X: 508 English-speaking respondents from 4,155 invitations is a ~12% achieved response, below the 20% assumed in the sample-size calculation, with no non-responder analysis reported.

Pebble et al. (2023) — 4.1 Can't tell: sampling is efficient but not clearly justified as representative of military-affiliated SV survivors specifically. 4.2 X: authors explicitly state the sample held more socioeconomic privilege than the broader population affected by sexual violence. 4.4 Can't tell: compensation-based online convenience recruitment does not have a conventional response-rate framing reported.

Gignoux-Froment et al. (2025) — 4.2 Can't tell and 4.3 Can't tell: the study-specific questionnaire's validation/psychometric properties are not reported. 4.4 X: 55% response rate with the authors' own acknowledgement that caregivers who responded were probably those most receptive to PFATO training, indicating likely selection bias.

Tynan et al. (2024) — 4.2 Can't tell: sample limited to active-duty personnel already enrolled in a weight-management trial; authors note this may limit generalisability to civilian or broader military populations. 4.4 Can't tell: <5% missing data reported, but response/enrolment dynamics of the parent trial are not detailed in this paper.

Rawcliffe et al. (2024) — 4.2 X: no female infantry recruits were enlisted during the data-collection window (structural limitation), compounded by an author-acknowledged self-selection bias (recruits with greater interest in nutrition more likely to participate). 4.4 Can't tell: completion rate as a proportion of eligible recruits is not explicitly reported.

2.2.7 Data Extraction and Synthesis

Data were extracted from each included study into Table 11 capturing study design, population characteristics, intervention/topic of interest, outcome measures, and key findings relevant to the review question.

Table 11: Publication Characteristics

Type of study	Author (year of publication), Country	Sample Size	Sample age range (years)	Aim	Data collection method	Reference Type
Qualitative	Sutton et al. (2023) UK	146 completed 12-month follow-up survey; 87 provided full responses (analysed)	20–52 (mean 33.75)	To understand the long-term impact of a multiactivity and adventurous training course (MAC) on the mental well-being and behaviour of recovering, in-service UK military personnel 12 months after course completion.	Online follow-up survey: 1 closed + 2 open-ended questions; abductive content analysis	Journal Article
Quantitative	Forchuk et al. (2025) Canada	567 total (508 English-speaking analysed)	Not stated as continuous range (categorical bands: <25 to >55)	To identify the relative importance of mental health and stress resilience (MHSR) training attributes preferred by Canadian Armed Forces personnel, and whether preferences vary by individual characteristics.	Online conjoint analysis (CA) choice-task survey (Qualtrics)	Journal Article
Quantitative	Pebole et al. (2023) USA	553 total (women n=355, men n=198); military-affiliated subgroup n=263	18–65	To identify perceived benefits/barriers to exercise, and preferences for exercise programme structure/content, among men and women survivors of sexual violence with military affiliation.	Online cross-sectional survey (Amazon Mechanical Turk); EBBS, PCL-5, PROMIS	Journal Article
Quantitative	Gignoux-Froment et al. (2025) , France	80 invited; 44 respondents (55% response rate)	20–>50 (categorical bands)	To evaluate the relevance of Psychological First Aid Training in Operation (PFATO) among military physicians/nurses, and identify complementary expectations for operational psychiatry.	Self-administered online questionnaire (MCQs, open-ended items, Likert scales)	Journal Article

Type of study	Author (year of publication), Country	Sample Size	Sample age range (years)	Aim	Data collection method	Reference Type
Quantitative	Bell et al. (2000) USA	99,981 (HRA takers, 1992); 429 hospitalised for MV injury during follow-up	18–41+ (categorical bands)	To identify demographic and behavioural risk factors associated with motor vehicle injury hospitalisation among active duty US Army personnel.	Health Risk Appraisal (HRA) self-report survey linked to hospitalisation records (TAIHOD)	Journal Article
Quantitative	Verrall (2019) UK	Predeployment n=1,374; mid-deployment n=889; postdeployment n=537	17–44 (categorical bands)	To investigate the risk propensity (impulsive sensation seeking) and health behaviours (alcohol, smoking, driving, sex) of UK Army personnel deployed to Iraq, across the deployment cycle.	Repeated-measures questionnaire (quantitative & qualitative) at 3 timepoints	Journal Article
Quantitative	Cole et al. (2019) USA	56 enrolled; 26 completers at 10 weeks	Adults (mean 51 ± 13; range not stated)	To assess the effectiveness of the revised My Body Knows When (MBKW) programme in promoting intuitive eating behaviours in a military-affiliated population.	Pre–post questionnaires (IES-2, MFES) + anthropometric measures; online or in-person	Journal Article
Quantitative	Tynan et al. (2024) USA	178 active duty (98.3% Navy, 1.7% Marine)	Mean 29.15 ± 6.93; range not stated	To examine the factor structure, reliability, and convergent/predictive validity of the Weight Loss Readiness Test (WLRT-II) in active duty military personnel enrolled in a weight-management trial.	Baseline questionnaires (WLRT-II, TFEQ-R18, single-item measures) + weight/attendance data	Journal Article

Type of study	Author (year of publication), Country	Sample Size	Sample age range (years)	Aim	Data collection method	Reference Type
Quantitative	Rawcliffe et al. (2024) UK	29 male + 26 female standard-entry recruits; 15 male infantry recruits	Mean 20.7–22.3 (SD 3.0–3.8); range not stated	To evaluate general nutritional knowledge (GNK) among British Army standard-entry and infantry recruits during basic training, and change over the course of training.	Nutritional Knowledge Questionnaire for Athletes (NKQA; paper-based)	Journal Article

Given the anticipated variation in study design, population, and outcome measures across the included literature, a narrative synthesis approach was adopted rather than meta-analysis, allowing findings to be grouped and compared thematically in relation to the barriers to behavioural change identified across the evidence base. Narrative synthesis refers to an approach to the synthesis of findings from multiple studies that relies primarily on the use of words and text, rather than statistical methods, to summarise and explain the findings of the included studies (Popay et al., 2006).

2.2.8 Summary of Systematic Review Methodology.

The combination of a PICO informed search strategy, independent dual screening, and design-matched quality appraisal was intended to produce a transparent and reproducible account of the evidence relating to barriers to behavioural change in health interventions among military and comparable overseas-deployed populations.

2.2.9 Systematic Narrative Review Findings

[Approach to Synthesis.](#)

Findings from the nine studies were analysed thematically, using the phases of thematic analysis by Braun and Clarke (2006). Familiarisation was achieved through completing the publication characteristics table and repeated reading of the results and discussion sections of each paper. Initial codes were generated relating to reported barriers of health behaviour change; these codes were then grouped, reviewed and refined into candidate themes, and checked back against the original papers to ensure each theme remained grounded in the reported data rather than in assumptions brought to the literature (see Appendices M). Four themes were identified: 1. the credibility of the person delivering the intervention and leadership engagement; 2. experiential, skills-based delivery that satisfies psychological needs; 3. a persistent gap between readiness or knowledge and actual behaviour change; and 4. situational, occupational and personal factors that constrain behaviour irrespective of intervention quality.

Theme 1: The Credibility of the Person Delivering the Intervention and Active Leadership Engagement.

Across several of the included studies, the perceived credibility of whoever delivered the health intervention, and the degree of visible support from the chain of command, emerged as more influential than the content of the message itself. Forchuk et al. (2025) found that instructor type and leadership buy-in were, alongside skills practice, the two most heavily weighted attributes in military personnel stated preferences for mental health and stress resilience training, with a clear preference for uniformed or civilian experts over uniformed peers or leaders whose expertise was not clearly demonstrated. A comparable pattern was reported by Gignoux-Froment et al. (2025), where healthcare providers trained in psychological first aid overwhelmingly preferred to train alongside their own unit (85.71%) rather than as individuals, and rated pre-deployment delivery, embedded within existing training structures, as the optimal timing. Pebole et al. (2023) similarly found that military-affiliated survivors of sexual violence strongly favoured exercise programmes delivered by an instructor, with a marked preference for an instructor of the same gender, over unsupervised or no-instructor formats. Taken together, these findings suggest that within military populations, the perceived legitimacy of the source, whether through professional expertise, shared unit identity, or leadership endorsement, may do more to determine engagement with a health intervention than the specific content delivered.

Theme 2: Experiential, Skills-Based Mode of Delivery

A second theme concerned the mode through which health-related content was delivered. Several studies reported more favourable outcomes, or stated preferences, for interventions that were experiential and skills-based rather than purely didactic. Forchuk et al. (2025) found that the opportunity to practise skills, particularly under simulated stress, was rated among the most important attributes of training by Canadian Armed Forces personnel, whilst Gignoux-Froment et al. (2025) reported that all respondents considered relational simulation a relevant teaching method for psychological first aid, valuing it above theoretical instruction alone.

Sutton et al. (2023) offer the clearest illustration of this pattern within a recovery context: the adaptive adventure sports course investigated in their study was explicitly designed around the three psychological needs described by self-determination theory, autonomy, competence and relatedness, and 74% of participants reported a sustained positive behaviour change 12 months after completion, with relatedness (61%) the most frequently cited influential element. Participant accounts such as “I realised more about myself and that I am in charge of my own destiny” and “I can do things if I put my mind to it” (Sutton et al., 2023) point to a shift in self-belief that appears to have outlasted the course itself, in contrast to the more modest and short-lived changes associated with one-off educational sessions elsewhere in the literature (see Theme 3).

Theme 3: A Persistent Gap Between Readiness or Knowledge and Actual Behaviour Change.

An important theme running through the quantitative literature was the frequent disconnect between an individual's stated readiness, motivation or knowledge, and their subsequent behaviour. Tynan et al. (2024) found that whilst the Weight Loss Readiness Test-II demonstrated adequate internal reliability and correlated as expected with related psychological constructs, none of its subscales, including motivation and confidence, significantly predicted actual weight change or programme attendance among active-duty personnel. Rawcliffe et al. (2024) reported a related pattern in a different area: British Army infantry recruits showed almost no improvement in general nutritional knowledge between the start and end of basic training (39% to 40% correct), despite having received a formal nutrition education session, leading the authors to conclude that a single 40-minute presentation was insufficient to shift knowledge, let alone behaviour. Even where knowledge or motivation was demonstrably present, this did not guarantee protective behaviour: in Bell et al.'s (2000) large cohort of Army personnel, younger soldiers and heavier drinkers remained significantly more likely to be hospitalised for motor vehicle injury despite Army-wide safety messaging, whilst Verrall (2019) found that personnel high in impulsive sensation seeking consistently displayed lower perceptions of operational risk, and correspondingly riskier health behaviours, than their

lower sensation-seeking peers. Across these four studies, readiness, knowledge and awareness appear to function as necessary but insufficient conditions for behaviour change within military populations.

Theme 4: Situational, Occupational and Personal Factors That Constrain Behaviour.

The final theme captured the range of contextual barriers that appeared to limit behaviour change regardless of an intervention's design. Time and competing occupational demands were cited repeatedly: Cole et al. (2019) reported a 56% attrition rate from the ten-week 'My Body Knows When' programme, with schedule conflicts and lack of time given as the primary reasons for withdrawal, whilst Pebole et al. (2023) found that military-affiliated survivors of sexual violence were significantly more likely than civilians to endorse high time expenditure, poor exercise environment and family discouragement as barriers to exercise. Verrall's (2019) qualitative data on alcohol use across the deployment cycle illustrated how situational pressures could push behaviour in either direction: personnel reported drinking more before deployment for reasons including stress and "enjoying life while you can", but also reported drinking less during deployment owing to restricted access and operational demands, before frequently returning to prior patterns, or exceeding them, on return home. These findings suggest that even a credible, well-designed and experientially delivered intervention operates within a wider set of occupational and situational constraints that may independently determine whether behaviour change occurs or is sustained.

2.2.10. Summary of Systematic Narrative Review.

Considered together, these four themes suggest that behaviour change among military and comparable deployed populations is unlikely to result from information provision alone. Where interventions were perceived as credible, delivered experientially, and attentive to autonomy, competence and relatedness, more sustained change was reported; where interventions relied on single, didactic sessions, or where readiness and knowledge were assessed in isolation from occupational context, the evidence pointed to a persistent gap between what

personnel knew or intended and what they subsequently did. This pattern is returned to in the Discussion chapter, where it is considered in relation to the theoretical frameworks introduced in Chapter 1.

CHAPTER 3 – STUDY METHODOLOGY

3.1 Introduction.

This chapter establishes the methodology including the philosophical stance underpinning the research and outlines the research approach employed. It details the research design, participant recruitment, data collection, data analysis, reliability and validity tests, ethical considerations and the limitations of the studies.

The study aimed to address the research question: What factors are associated with self-reported behaviour change following the PDT health brief? To achieve a comprehensive understanding of these, a Mixed Methods Research (MMR) approach was adopted. The MMR studies worked synergistically as the quantitative study provided a large dataset which highlighted areas of statistical significance, while the qualitative themes gave more depth of understanding as expressed by the Military personnel who were the participants. This approach was essential for understanding the attitudes towards the brief and subsequent reported health behaviours of Military personnel, being delivered in military settings. The MMR approach also allowed for triangulation of the results from both studies and captures measurable outcomes while also conceptualising them within the lived experience and perspectives of Military personnel. The MMR approach then serves to strengthen the validity and credibility of the research.

3.2 Philosophical Stance.

It is important to discuss the philosophical underpinnings of this research as this shaped the research design, methodology and interpretation of the findings (Huff, 2009).

This thesis aims to address higher philosophical matters, especially “knowledge” regarding how the participants gain health knowledge and “reason” such as what influences the individual participants to take advice (change their behaviour) when recommended to do so

A paradigm is the overarching framework which provides the philosophical stance of any research, with key elements; ontology (the existence of reality), epistemology (what is the basic belief about knowledge) and methodology (tools and techniques of research) (Guba and Lincoln, 1994). Critical realism was the paradigm deemed appropriate to frame this research as the author was eager to link the objective and subjective dimensions of reality to answer the research question. Critical Realism states that an external reality exists independent of human perception but acknowledges that our understanding of this reality is mediated by social, cultural and psychological factors (Bhaskar, 1978). This stance compliments both quantitative and qualitative methods enabling the author to explore objective measures (e.g. illness suffered) while providing subjective experiences (e.g. Military personnel's behaviour and attitudes).

Other paradigms were considered by the author when framing this research. The quantitative study arguably follows a positivist paradigm, as this describes knowledge through scientific methods using quantitative data collection. A positivist paradigm is founded on the philosophy that knowledge can be observed, measured, and described using systematic scientific methods (Creswell, 2014). Cohen et al (2018) further explains that a positivist paradigm is underpinned by the notion that reality "exists independently of human perception". Critics of positivism argue that it ignores the complexity and richness of social phenomena which in turn oversimplifies the human experience (Guba & Lincoln, 1994). Positivism has also been criticised as it does not consider the context in which social actions occur which may include strong cultural or situational influences (Bryman, 2016). This oversight is particularly relevant in environments like those encountered by Military personnel where unique situations and cultural sensitivities can significantly impact behaviour. Additionally, human subjectivity is disregarded which is important in understanding lived experiences, emotions and ultimately why people take the actions they do (Cohen, Manion & Morrison, 2018). The quantitative study in this research aligns with the positivist paradigm because it seeks to measure attitudes and behaviours using a structured instrument (questionnaire), with the collection of data and analysis based on numerical

evidence. This methodology supports the positivist focus on empirical, measurable phenomena enabling the identification of patterns and relationships within the data.

Interpretivism is a research paradigm that could have informed the qualitative aspect of this study, as it focuses on understanding social phenomena from the perspectives of those involved. Unlike positivism, which assumes that social reality can be fully understood through objective measurement, interpretivism prioritizes subjective experiences and the ways people construct meaning through their interactions. It aims to explore the complexity of human behaviour within its social and cultural contexts, such as the meanings Military personnel attach to their actions and experiences, acknowledging the socially constructed nature of reality (Bryman, 2016; Creswell, 2014).

The fundamental distinction between positivism and interpretivism lies in their approach to context and interaction. While positivism emphasizes objective measurements, interpretivism stresses the importance of understanding the nuanced relationships and contexts that shape human behaviour (Cohen, Manion & Morrison, 2018).

This study, however, draws on critical realism, which integrates quantitative and qualitative methodologies within a mixed-methods research framework. Critical realism provides a balanced perspective by recognizing the existence of an objective reality while also accounting for the role of interpretation and understanding in making sense of that reality (Creswell, 2014; Maxwell, 2012).

Ontology is concerned with conceptualising the perspective such as the service person's beliefs of what information they were given, and whether it was specific to their needs. In this research, the quantitative methods capture data on patterns, trends and generalisations which all align with critical realism's acknowledgement of an objective reality. The qualitative methods uncover the meaning and contextual factors that shape that experience recognising subjective knowledge and social constructs.

Epistemology is concerned with the nature and scope and limitations of knowledge and is concerned with "what is knowledge"? The quantitative data can describe observable

regularities whilst the qualitative insights are necessary to understand the mechanism and context driving those regularities.

It is prudent to mention that Denzin and Lincoln (2000) included Axiology (how to act) as a philosophical assumption which is integral to this research when considering ethical considerations (ethical considerations will be covered later in the Methodology Chapter). All the participants attitudes and beliefs from this study will contribute to actionable improvements in military health interventions.

An awareness of philosophical assumptions will increase the quality of research according to Patel (2015).

The philosophical stance adopted in this thesis is discussed earlier in this chapter, but this section will reiterate the specific underpinnings of the qualitative phase.

The “Process of Research” table compiled by Denzin and Lincoln (2011) is a conceptual guide that the author used to ensure all the qualitative research components were considered for this research. It provided a structure and visual framework which assisted navigating the philosophical stance involved in a mixed methods research military study of this kind. Table 4 is adapted from the Process of Research Table to clearly visualise the processes used for each component of the qualitative study in this thesis.

Table 4: The “Process of Research” table by Denzin and Lincoln (2011) adapted to detail the processes used in this thesis.

Components	Process
Philosophical Paradigms	Critical Realism
Strategies of Inquiry	Mixed-Methods approach
Methods of Data Collection	Focus Groups
Methods of Data Analysis	Thematic Analysis
Interpretive Frameworks	Social Constructivism Critical Theory

Ethical Considerations	Informed Consent Confidentiality Security Considerations
Criteria for Evaluation	Credibility
Presentation and Writing	Description Military style

Denzin and Lincoln (2011) ask about the researcher and what they bring to the inquiry (the researcher's history and research tradition, conceptions of self and the other, the ethics and politics of research).

The qualitative phase of this study follows Critical Realism as a research paradigm as it seeks to understand the meaning Military personnel attach to their experiences and actions (socially constructed nature of reality).

The ontological foundation, which is concerned with conceptualising the perspective, draws towards the service persons beliefs of what information they were given and whether it is specific to their needs.

3.3 Authors Stance

The author's professional background is within the Force Health Protection (FHP) field of the military which is comparative to the Public Health career stream in a civilian workplace.

Within FHP, the belief is that currently health interventions do not result in Military personnel taking the necessary advice and changing their behaviour to positively impact on their health outcomes. Supporting evidence (other than anecdotal) for this pre-deployment has not been found (this knowledge gap was highlighted in Chapter 2- Literature Review), but there is evidence from a US Military Joint publication 4-02 that post-deployment behavioural health interventions are not successful. They found that the reason for this was that they became a low priority amongst US military personnel once they had returned from overseas theatres.

Disease Non-Battle Injury (DNBI) continue to occur on 'modern' (in the last 11 years)

overseas operational tours, and accounts for more mortality and morbidity than injuries sustained through warfighting (Akhtar et al 2022; Hollingsworth et al. 2016; Bonser & Fawcett 2013) indicating that overall health interventions are not successful at positively changing health behaviour. The author acknowledges that FHP covers many different areas of healthcare in order to make a service person ready to deploy but that pre deployment training stage is a good starting point in ensuring a military persons deployability. FHP can be deemed as a Workplace Health Promotion (WHP) Programme, which has been shown to be successful at significantly improving workers health and sustainable employment by Boagaers et al (2024) in the Netherlands Armed Forces.

From a personal perspective, the author has experienced the PDT Health Brief, first attending it in 1994 prior to their initial operational tour to Bosnia and subsequently during other tours in the British Army. The author observed that the presentation remained largely unchanged on each occasion over the years, despite the overseas country of deployment (and therefore health risks) being radically different. It was also noted that attendees generally paid little attention to the presentation except for any humorous sections, or if the person delivering the health brief was particularly charismatic. This anecdotal evidence motivated the author to investigate if the health brief required improvement or whether a new approach was necessary, with the aim of providing scientific evidence for any proposed changes.

Rather than relying on anecdotal and personal experiential evidence, the author commenced an academic journey in search of ways to reduce DNBI and improve the attitude towards health interventions in the military. The author believes that it was recognising the limitations of time constraints of earlier master's dissertations, which ultimately led to the desire to pursue a PhD. A PhD would allow the author to collect both quantitative and qualitative data with the window of opportunity being only a few days every 6 months as the regiment's changeover. The data were collected over 1 year and then thorough investigation of the problem and comprehensive analysis of the data could then take place, resulting in a well-

rounded project. The longer time and opportunity also allowed engagement with the theoretical literature underpinning this research.

The two master's degrees only allowed 1 year for the dissertation module which meant the desired approach could not be fully incorporated.

The first academic work carried out by the author was as part of a master's degree in public health. The dissertation focused on one of the main causes of DNBI in Military personnel on operations which is dental disease and subsequent dental pain. Titled "Oral Health Support to British Military personnel on Operations in Afghanistan" (Willoughby, 2011), it was a quantitative survey using questionnaires distributed to Military personnel deployed to Afghanistan. The study concluded that dental pain was experienced by 23% of those who deployed and caused significant distraction during critical tasks. The author further explored DNBI in a subsequent dissertation submitted for a master's degree in environmental health. This dissertation, titled "Incidence of Gastro-intestinal disease in Military personnel on Ex SAF SIERRIA in Kenya" (Willoughby, 2015) addressed gastrointestinal (GI) conditions, a common DNBI on deployments. This study showed that GI issues caused serious operational capability shortfalls, as affected Military personnel were unable to fulfil their roles. However, the author identified a limitation in both studies: the inability to delve deeper into causal questions. Both studies relied on closed ended questions which provided data on the prevalence of DNBI on the respective tours rather than exploring the views of the participants on the pre deployment health brief. These studies focused on the immediate impact of suffering DNBI, such as working time lost, but did not provide sufficient information required to make improvements to the health brief. The author believes that this gap can be addressed through mixed methods research design proposed for this thesis, which aims to provide a more holistic understanding of the issue.

The author's primary rationale for researching PDT effectiveness, is the desire to better prepare British Army personnel for deployment. Effective health interventions could have significant effects on Military personnel, enabling them to perform their duties in the high tempo, usually austere, environment of operations without unnecessary illness. Achieving

this requires imparting the necessary knowledge which Military personnel understand before deployment.

Drawing from personal experience in the medical/ health field, the author's belief is that currently health interventions do not sufficiently change individuals' behaviour.

Lastly, the author acknowledges the existence of many unexplored variables affecting the attitudes towards health interventions in the military, such as the organisational and hierarchical culture, leadership support and individual service persons differences and learning styles. These factors will also be considered as part of this PhD research to ensure a comprehensive approach following the research design explained below.

It is the authors' aspiration to continue and expand work within this field, in order to improve the conditions of Military personnel on operational tours as they dedicate themselves to defending their country.

3.4 Research Design.

This thesis uses a Mixed Methods Research (MMR) approach to enable a holistic look at the health brief to identify the barriers to behaviour change in military personnel. The MMR approach involved carrying out a quantitative study using questionnaires on two Regiments, followed by a qualitative study using three focus groups. The research design aligns with the four research objectives as follows; one of the primary aims of this research is to identify if there were health behaviour changes in Military personnel following the health brief. The quantitative study was able to measure the participant reported perceived health behavioural changes (numerically and percentages) and any factors which significantly increase the risk of not changing behaviour. The qualitative study then built a picture of why health behaviour changes were or were not implemented, revealing the gaps where the intervention failed or parts that were deemed effective in the service persons view.

The second primary aim was to look at Military personnels attitudes towards the pre-deployment health brief. The quantitative data addressed if a service persons attitude (using a Likert scale) had any correlation with a worse health outcome by providing measurable

data. The qualitative study explored the Military personnel's attitudes more deeply to help understand why this positive or negative attitude towards health interventions exist.

There were secondary research aims which were to identify what the participants thought about the health brief delivery, if the participants took any risks to their health and if they had any DNBI whilst deployed. This research design also addresses these secondary aims as follows; the qualitative research provides data on the participants' perception of the health brief including its delivery and mode of communication which the qualitative research delves deeper into to seek clarification from the participants as to why the brief was good or bad in their view. The quantitative research provides data for the last two aims in the form of the DNBI burden and risk-taking appetite. Once again, the qualitative research enables enquiry of the participants as to what DNBI they suffered and the underlying reasons why they took risks to their health.

3.5 Mixed Methods Research (MMR).

MMR is also referred to as Multi-Methods (Brannen, 1992), Multi-Strategy (Bryman, 2004), Methodological Pluralism (Kellert et al, 2006) and Mixed Methodology (Tashakkori and Teddlie, 1998 & 2003) and describes the collection and analysis of data using more than one research method. All agree in principle with Creswell, 2003 of what MMR is not; MMR is not collecting both qualitative and quantitative data separately without combining them, or just having both data available or an addition/ extension to one method (for example a text box in a quantitative questionnaire is not MMR).

There are several definitions of MMR but Creswell and Clark (2007) use core characteristics which provides some clarity: MMR must collect and analyse both qualitative and quantitative data (based on the research Question), mix the two forms of data (either concurrently or sequentially), gives priority to one or both forms of data, uses the MM procedure in a single study or multiple phases of a programme of study, frames these procedures within philosophical worldviews and combines these procedures into specific research designs that direct the plan for conducting the study.

In addition to MMR being utilised to enable deeper understanding of an individual area of study, it also facilitates the progression of new research techniques and methods.

Onwuegbuzie & Leech (2005, p. 375) go so far as to say “Mono-method research is the biggest threat to the advancement of the social sciences. Indeed, as long as we stay polarized in research, how can we expect stakeholders who rely on our research findings to take our work seriously?”

There are three main MMR designs that could have been used in this research; Convergent, Explanatory Sequential and Exploratory Sequential (Creswell 2015). Convergent involves simultaneously collecting the data but analysing separately and the results are then merged or compared to draw conclusions. This design was not used as questionnaires were used to collect the quantitative data and focus groups for the qualitative data and were not collected at the same time.

Exploratory Sequential design explores if there is a problem through the collection of qualitative data collection and analysis, then develops an intervention and conducts a third quantitative phase. It can be used for a number of reasons including to explore under-researched topics, to develop and refine instruments (e.g. survey and questionnaires), to address contextual nuances and to test generalisability (Creswell, 2015). Due to the phases, this design shows rigour however it does not suit this project as it is already known that there is a problem with Military personnel's attitude towards the health brief in the authors area of study

Explanatory Sequential MMR was the design of choice as the quantitative data were collected and analysed, then the second qualitative strand to explain the quantitative results. The quantitative data results collected do not explain why the participants had this view/belief but instead gave baseline figures that could be explained when participants in the focus groups expanded on the key areas (the delivery and participant attitude towards the Health Brief).

MMR was used to conduct this research as both the quantitative and qualitative data complement each other to reveal a detailed picture of the reported views of the participants,

however the method has some strengths and limitations as follows: The biggest advantage of quantitative data are that it provides a conclusion for large numbers over a wide geographic area and can analyse relationships and associations in the data but it's limitations are that it provides a limited understanding of the views from "people" (Creswell, 2013). Qualitative data provide information on the experiences and views of participants but can be highly interpretive and only carried out on smaller numbers.

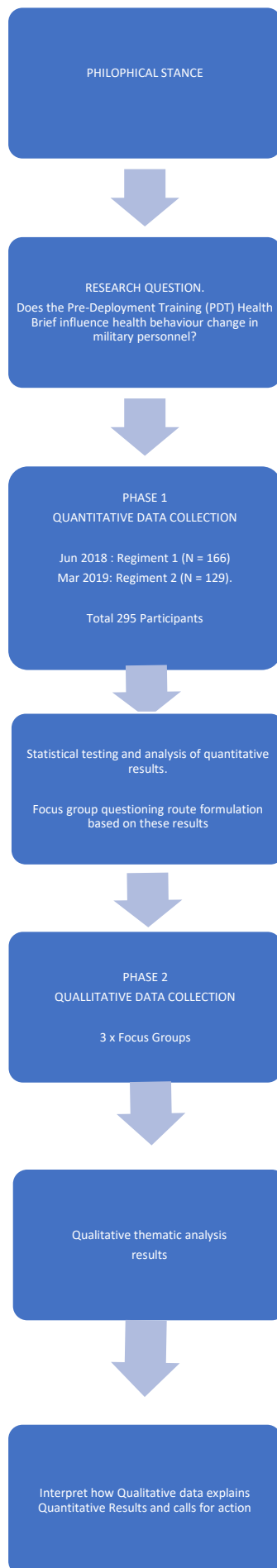
In this research, the quantitative data gives the essential participant demographics and then explores, in a numerical form, views on the perceived importance of the health brief and the delivery. The latter questioning indicates self-reported illness or injury suffered, in what form and if it was reported to their Medical Centre. The qualitative data then searches for the deeper meaning and the reasoning behind the participant views, and also what they think would improve the delivery and understanding of health information prior to an operational tour.

Triangulation of the two studies results happened at the interpretation stage. The qualitative insights are used to explain the quantitative findings further.

Diagram of Procedures – Explanatory Sequential Design

This diagram intends to visually convey the Explanatory Sequential Design used including the key elements according to Ivankova, Creswell and Stick (2006).

Figure 1: Advanced Design Diagram: Explanation of Behavioural Change within this military cohort (using an Explanatory Sequential Design).



3.6 PHASE 1: Quantitative Study Methodology.

The quantitative study is a descriptive, cross-sectional study using quantitative questionnaires as a means of data collection. According to Creswell (2014, p. 979), descriptive studies aim to “provide a detailed, accurate, and systematic description of a phenomenon”. In this study the phenomenon is the behaviour and attitudes of Military personnel towards the health brief. A cross-sectional design was chosen to collect the data at a single point in time as Military personnel were returning from Iraq, distinguishing it from longitudinal studies that run over an extended period of time. Collecting data as personnel returned from Iraq was crucial for understanding the phenomenon as their recollection of events from their deployment will be more prominent in their memory. A cross-sectional design is advantageous for describing prevalence or distribution and identifying correlations which was needed in this study to find the prevalence of illness suffered (DNBI) and establish if the health brief is associated with health behaviour changes (Bryman, 2016).

3.6.1 Quantitative Study Approach.

The main advantages quantitative research on this cohort primarily allowed the research question to be addressed which was: “Does the attitude and behaviours of Military personnel impact on positive health behaviour change following the health brief?”. Additionally, a broad range of views about the health brief delivery, risk taking and illness suffered could be collected at the same time. The data could be collected efficiently and effectively, and sizeable numbers could be obtained which increases the strength of the statistical results. It was critical that the data were generalisable to the wider the British military to accurately represent this Population At Risk (PAR). The author had access to all Regiments (who have the same Operational Establishment Table) who deployed to the same theatre over a year timeframe and was able to use two different Regiments to study (opportunistically as they deployed during this study timelines). Using two Regiments increases the studies validity as it increases the number of participants, increasing the strength of any statistically significant findings. Using quantitative questionnaires was integral to this cross-sectional study as it

allowed for ‘standardized data collection’ (Fowler, 2014) that enabled a comparison between all participants and therefore analysis to be made across a large sample.

This quantitative research enabled the collection of numerical data, which was precise and could be analysed statistically, providing clear and specific results. Statistical techniques allowed inferences about this population based on the data collected from a sample (Creswell, 2014). Comparative analysis enabled the researcher to identify patterns, trends, and differences, contributing to a better understanding of the social phenomena (Neuman, 2013).

These data also provide an opportunity to be able to predict the Military personnel who are more likely to change their behaviour or are likely to take risks. This is useful information as these groups can be targeted in health interventions to reduce or eliminate their chances of becoming a DNBI casualty. The Chain of Command can then mitigate and plan for this.

Quantitative research provides empirical data that can inform decision-making processes, and, in this case, the data will inform future health interventions prior to deployments. The Chain of Command can rely on these quantitative findings to make informed choices. (Anderson, Sweeney, Williams, Camm, & Cochran, 2018).

3.6.2 Sampling Strategy

Sampling techniques can be categorised as probability sampling and non-probability sampling. This study uses non-probability sampling as not every service person in the British military had a chance of being selected to complete a questionnaire, and it is often used in exploratory research such as this. Specifically, Convenience Sampling was employed as the participants were selected based on their accessibility (the fact that they were on this particular flight back to UK from Iraq) and willingness to participate (Etikan et al, 2016). This also included the availability of the researcher to get to Akrotiri which was the stopover point for onward travel to UK, to collect the data. The advantage of this was that it was quick, and the participants were available, but convenience sampling carries a high risk of bias; the participants not being representative of the broader population. However, it can be argued that the demographics of each Infantry Regiment would be similar to other Regiments in the

British Military, so this sampling bias is reduced. As noted by Creswell (2014), convenience sampling can be practical for exploratory research as this study was, but it may introduce sampling bias, impacting the external validity of the study.

It is acknowledged that although this study uses a non-probability convenience sampling method, it has a cross-sectional study design. Convenience sampling relates to participant selection, while cross-sectional relates to the timing and structure of data collection (Creswell, 2014; Etikan et al., 2016; Levin, 2006).

Recruitment of participants was via the Operational Establishment Table (OET) (which is a list of those who deployed) and were cross referenced per aircraft when they arrived at the post operational staging area.

The demographics data collected included the service persons age category, ethnicity, Joint Medical Employment Status (JMES), Service or Corps, educational level and the number of operational tours completed in their career. These demographic characteristics are meaningful due to their potential influence on attitudes and behaviours (which will be discussed in Chapter 4 – Results).

The inclusion criteria were all Military personnel who deployed on the operation whether they received a health brief or not (the Operational Establishment Table (OET)) and flight manifest were cross referenced with the Pre-Deployment Training health brief attendance register. Exclusion criteria were any civilian contractors and personnel who did not deploy. The sample size was predicated on the number of Military personnel who were able to get on the flights from Iraq. They returned on a Royal Air Force C-130 Hercules with a maximum load of 92 people (plus their personal equipment) and civilian airlines planes which could load 137 personnel.

3.6.3 Data Collection Methods

The data collection method was via questionnaires which provided the quantitative data to give baseline evidence on the behaviour and attitudes of participants towards the health brief. Quantitative data collection enabled the researcher to capture a large number of participants, quickly and cheaply. The data were collected in Jun 18 at RAF Akrotiri check in

desk. N= 295 with one participant opting out. The questionnaire was given to participants once they had completed a 6-month tour and asked if the health brief was delivered in an effective manner for them, if they changed their behaviour and/or took any risks whilst on tour. The final questions investigate if they had an illness or injury and if they reported it to the medical facility. The questionnaire was piloted in the Research Lead's own Army Unit and amendments made including adding a Likert scale for Q21.

The data were collected on iPads using the Bristol Online Survey (BOS) tool. These data were downloaded into an Excel database and the results converted using numerical codes as SPSS works better with this. The data were imported into SPSS and checked for anomalies or missing data.

The Response Rate was 295 participants who completed the survey, made up of Regiment 1 (n = 166) and Regiment 2 (n = 129). The response rate was 99.7%. 1 participant declined to complete the survey. The response rate was above what is usually seen due to the location and timing of the data collection (the Staging Post) being ideal. The participants were not tasked with any other duties and were waiting for their flight to the United Kingdom, so it was a convenient time for them.

3.6.3 Questionnaire Design

The overall advantages and disadvantages of using a questionnaire as a tool to collect the data in this cohort will now be explained, followed by details of the specific questions that appeared in the questionnaire, why they were asked and what purpose the specific questions presented.

As mentioned in the literature review chapter two, published DNBI research has concentrated on the prevalence of a particular disease in this cohort rather than identifying what is the cause of non-compliance with the health advice offered in the health brief. For this reason, the questionnaires provided a quick way to assess the overall behaviour and attitudes towards the health brief in this cohort.

The questionnaires were also used as they could gather 'surface level' data spanning all the key themes to be explored due to the specific questioning (Fink, 2019) whereas other tools

can capture richer and more detailed data allow for probing and exploration of responses (Patton, 2015) as in the qualitative focus groups.

Another major advantage was that it was cost-effective compared to other methods that would have required more resources (Creswell, 2014). The resources needed for this phase were free as it consisted of the authors time which was free as was classed as “on duty”, flights that were free ‘trooping flights’ (meaning they are routine flights put on for military personnel to move around theatres at no cost to the Service Person) and the equipment used consisted of iPads which were on loan from the authors Unit. The other advantage was that this questionnaire provided the same, standardised questions for all participants in both Regiments ensuring consistency in data collection across participants (Babbie, 2016).

Bryman (2016) also thought that using other tools might not provide this standardisation which he thought would lead to “variability in data collection due to differences in interviewers, observers, or record keepers”.

The disadvantages and definite limitation of using questionnaires for this phase was that the author felt disengaged with participants, with no interaction other than to invite them to participate before handing them an iPad. Equally, the participants may have been less engaged compared to other methods (Dillman et al., 2014) such as one-to-one interviews and observations which allow the researcher to be able to directly interact and engage with the participant. This can lead to deeper insights and rapport building (Rubin & Rubin, 2011).

The researcher ensured that participants were able to complete the questionnaires with privacy to prevent any social desirability bias if a peer could see their answers.

The questionnaire used for this study (see Appendices A) was adapted from the Operation TRENTON Force Health Protection Survey Questionnaire as the operation itself had similarities to the operation the participants of this study were embarking on to Iraq. These similarities involved the operation type, numbers of Military personnel deploying, climate of the country and conditions in the country of deployment. The operation type was a non-kinetic tour, meaning there is no war fighting but instead the military is expected to carry out humanitarian or training tasks. In this case, Operation TRENTON was the contribution of the

UK military in support of the United Nations Mission in South Sudan (UNMISS) and was a humanitarian aid tour. It also deployed similar numbers of personnel (300 Military personnel) as to the Iraq deployment. The operation consisted of an engineering task force, with the bulk of the units from the Royal Engineers, in addition to military medics, logisticians and force protection personnel which is also a similar demographic to the Iraq tour. The Op TRENTON survey was designed to assess the preparedness of personnel deploying from a health perspective, so it also covers questions about vaccination status and other pre deployment health indicators that assist with Force Health Protection of Military personnel. These questions were deleted as the authors aim was to get a perspective of Military personnel on their attitudes towards the health brief and if they made any behavioural changes, rather than assessing their health “readiness to deploy”. The questions in the Op TRENTON questionnaire which were retained in the Iraq questionnaire for this quantitative study were about the participants demographic details (age, previous deployments and JMES) and the receipt of the health brief pre-deployment, and once in theatre. In addition, there are also questions relating to the contents and relevance of the health brief in the Op TRENTON questionnaire which were also asked in the Iraq questionnaire. The Iraq questionnaire included closed-ended questions with predetermined response options mainly, but there were also two questions which necessitated the use of a Likert Scale as they were asking the participants to rate their opinion. This proved more challenging to analyse which will be discussed later.

The following table provides the justification for including each question.

Table 5 shows the questions included in the questionnaire and what information they provided.

Q no.	Question	Justification
Demographics: These provide details on the Military personnel’s background.		
1	Age Category: 18-25, 25-30, 30-35, 35-40, Over 40	This question will aid understanding of how age influences behaviour, any

		variation in attitudes, health risks, and operational effectiveness.
2	Ethnicity Were you brought up in UK?	Cultural and geographic backgrounds can affect health susceptibility and response such as research from British Army Gurkha's who experience lower GI disturbance if they have been brought up in Nepal (Connor & Gutierrez, 2013)
3	Trade/CEG	Links their job role to potential knowledge, attitude, and health outcomes.
4	Educational level (e.g. GCSE's, Level 5, none)	Education may correlate with health literacy and risk awareness.
5	What is your Joint Medical Employment Standard (JMES)? MFD/MLD/ MND	Determines deployment readiness and any health restrictions. SP may deploy as MND/MLD with caveats (Appendix 26 needed)
Deployment Details		
6	Number of previous operational tours	Highlights how operational experience may impact health outcomes and preparedness.
The Health Brief General		
7	Do you remember receiving a health brief? Yes, No, can't remember	Ensures awareness and recall of essential pre-deployment information.

		This could also demonstrate the importance placed on health by the SP
8	Did the Health Brief meet your expectations? Fully, Partially, not at all	Identifies perceived effectiveness of the briefing.
9	Do you think there is a need for the health brief? Y/N Should it be delivered: Before every Op tour Just the high tempo tours For tours in certain countries First tour only Not needed at all	Assesses relevance and timing preferences of the brief. Attitude question: Are they more concerned with perfecting military skills prior to deployment, than their own health? Is the brief better placed at a different time rather than the busy pre deployment time. They might feel they are aware of all the health risks and do not need it repeating for each tour.
10	How many days had you been in Theatre when you received another health brief? I did not 0-3 month 3-6 months	Ensures compliance with health briefing policies during extended operations. Any enduring op (more than 3 months) must have an audit in theatre
11	Overall, On a scale of 1-10 how much attention did you pay to the brief	Gauges engagement and prioritisation of health information.

		Self-validating questions
The Health Brief Content		
12	When was the Health Brief in the programme? (beginning, middle, end) And do you think this was in the right place?	Optimizes timing of delivery to enhance impact. The SP may prefer the brief to be at the end as the info will be fresh in their mind before they deploy or at the beginning to get it over with, dependant on their attitude towards it.
13	Was the length of the health brief during your PDT too long/ about right/ too short?	Balances content delivery with attention span. Also shows if they feel that it is important.
14	Who do you think should deliver the health brief? (Health Professional – EHT, Health Professional – own RMO or Unit Medic, Health Professional – External to your unit, CoC, Peer?)	Identifies most effective and trusted communicators. Currently delivered by an EHT Stage 3 will look at mode of delivery, learning styles and simulation suites. TRiM is delivered peer to peer <u>TRiM overview</u> but an evaluation found no significant change in psychological health (small Numbers) http://onlinelibrary.wiley.com/doi/10.1002/jts.20538/full
15	Do you think the health brief should be delivered in groups according to:	Customizes delivery method to improve engagement.

	Rank Size Operational experience Age Those from a medical background	A SP may feel more comfortable asking a question if they are surrounded by their peers or in smaller groups.
16	Which do you think is an appropriate venue for the health briefs: Lecture theatre Classroom based In a medical setting (such as the Medical Centre) Social setting	Determines most conducive settings for briefings. This question will link with Stage 3 of implementing a change of delivery method. This may take the form of small group classroom-based scenarios or simulation suits.
17	Did you know how to protect yourself against illness and injury on the operational tour after the health brief? Yes, No, Not sure	Evaluates clarity and practical impact of brief content. This will answer the question “was the brief fit for purpose?”
18	Overall, what number would you use to rate the health brief (where 1 is the worst and 5 is the best)? 5 Excellent , 4 Above Average, 3 Average, 2 Somewhat poor ,1 Poor	Assesses overall effectiveness and satisfaction. Overall ideas from those who have lived it.
Behavioural Change Q's		
19	Did you adopt a practice/ change your usual routine as a result of the health brief? (please give details below) – change to yes / no question	Links brief content to behaviour changes.

		If this is low, then it provides more evidence to say that the health brief is not effective.
20	Did you take a “risk” to your health even though you knew the possible result?	Explores barriers to compliance. Follow on interview to identify why a risk was taken.
21	What was this risk (tick all that apply)? Not carrying out advised sanitation procedures (like washing hands before eating) Not taking medication as advised Not using PPE Eating local food Drinking local water Swimming in local water Being sexually active with sex workers Not carrying out Dental Hygiene Not carrying out correct manual handling techniques Playing contact sport Other	Highlights key health risks ignored and informs messaging improvements. This can also be cross referenced with age etc and will highlight the main PH message that is being ignored. Comment box
DNBI		
22	Did you suffer from an illness or injury whilst on tour?	Tracks illness/injury incidence to evaluate prevention efforts.
23	If so which category would you put your illness or injury:	Identifies common health issues and gaps in preventative measures.

	Muscosskeletal Diarrhoea & vomiting Dental Pain STI (following sexual activity) Skin complaint Communicable Disease (such as Malaria) Flu Heat illness Other	Cross referenced with those who took risks
24	Did you report this illness or injury to the Medical CoC? If not, why not?	Highlights barriers to seeking medical assistance. Evaluation of access and attitude to Med treatment

3.6.4 Data Analysis Methods.

Data were analysed using the statistical software SPSS (Statistical Package for the Social Sciences) Version 25 & Version 28. The statistical techniques employed were descriptive statistics, cross tabulation of behaviour and attitude variables using Chi Squared and Fishers Exact tests and logistic regression modelling.

Missing data were handled using multiple imputation or listwise deletion, depending on the extent and randomness of the missing data.

Some participants selected more than one option within some of the questions (for example when asked who should deliver the health brief), which is why the percentages do not add up to 100% in all rows. This means the figures reflect the proportion of people who chose each option, not a total split of responses. Additionally, some participants may have skipped the question, which could also account for any discrepancies.

To account for multiple comparisons, Bonferroni Correction was applied to adjust significance thresholds where appropriate. Bonferroni correction was used to reduce the chance of obtaining false-positive results (type I errors) as multiple tests were performed on these data. As there are 22 comparisons, applying a Bonferroni correction changes the statistically significant threshold from 0.05 to $0.05/22 = 0.002273$. Therefore, any p-values > 0.002273 are not deemed statistically significant.

3.7 PHASE 2: Qualitative Research Methodology

This study adopted a qualitative design to examine how British military personnel understand and respond to a pre-deployment health intervention. A qualitative approach was considered most appropriate because the research sought to explore not only what participants think, but how those views are shaped through interaction, organisational culture, and rank-based social structure. Qualitative research methods help explore complex issues by focusing on experiences, perceptions, and behaviours rather than just numbers. A qualitative study enabled expansion and deeper investigation into the answers given in the quantitative study as the second phase of this mixed methods research (MMR). This section compares the most commonly used qualitative methods; interviews, ethnography, case studies and focus groups (the latter being the method of choice for this research).

Interviews are one of the most commonly used qualitative methods because they allow for deep exploration of individual experiences. They provide flexibility, letting researchers ask follow-up questions and dig deeper into responses (Rubin & Rubin, 2011). Confidentiality is another advantage, as participants may feel more comfortable discussing sensitive topics in a one-on-one setting (Seidman, 2019). However, interviews can be time-consuming, both in conducting them and analysing the data afterwards (Patton, 2015). Time was a limitation in this research as the participants had their follow-on flight back to UK to catch. Interviews also lack group interaction, which Bryman (2016) thought was useful in understanding shared experiences and social influences. The author agrees with this and deems it crucial in this research with military personnel as they live and work closely with each other whilst in

theatre. Additionally, because interviews focus on individuals, they don't capture group dynamics in the way other methods do (Creswell & Poth, 2018). These group dynamics in a military setting may provide a deeper understanding of who or what influences this cohort. Ethnography takes a different approach by immersing the researcher within a particular group or culture to observe behaviours and interactions firsthand (Geertz, 1973). This method provides rich, contextual insights and helps researchers understand how people behave in their natural environment (Fetterman, 2019). However, the researcher in this study did not have access to the participants environment (i.e. the camps in Iraq) due to the safety concerns of deploying someone who was not involved in the mission, to be able to carry out observations. An Ethnographic study is also time-intensive and requires prolonged engagement (Agar, 1996), which was not practical in this study. Ethical concerns, such as gaining access to participants as mentioned above, and maintaining neutrality, also make ethnographic research more complex (Emerson et al., 2011).

Case studies focus on analysing a specific event, individual, or intervention in depth. They allow for a detailed examination of a particular case and often include multiple data sources to strengthen findings (Stake, 1995; Yin, 2018). The main drawback is that case studies have limited generalisability, because they focus on one or a few cases, their findings may not apply broadly (Flyvbjerg, 2006). This is important in this research as the aim is for the findings to be generalisable to the whole military. Additionally, case studies can be time-consuming, requiring significant data collection and analysis (Simons, 2009).

Focus groups, on the other hand, create opportunities for discussion, allowing participants to build on each other's ideas and share common experiences (Krueger & Casey, 2015). They are also more time-efficient than individual interviews since multiple participants contribute at once (Morgan, 1997). Another benefit is that researchers can observe group dynamics and how social influences shape opinions (Barbour, 2007). All of which provided the data needed in this research. The disadvantages could include participant hesitancy to share openly, especially when discussing sensitive topics (Stewart & Shamdasani, 2014) like their health and risk-taking appetite in this research. Others might dominate the discussion, while quieter

participants stay on the sidelines (Gibbs, 1997) which was a factor for consideration given the hierarchical rank structure in this cohort. There are also confidentiality concerns, as participants might be reluctant to express certain opinions in a group setting (Bryman, 2016) such as the poor standard of food being produced by military chefs (who may also be friends).

Each qualitative method has its place, depending on the research goals. Interviews are good for in-depth individual insights but lack group interaction. Ethnography offers deep contextual understanding but requires significant time and ethical considerations. Case studies provide a thorough analysis of a specific case but may not be widely applicable. Focus groups encourage discussion and reveal group dynamics but consideration is needed with challenges in terms of dominance and confidentiality. Focus groups were chosen as the method in this research as it fit the study's objectives, available resources, logistical considerations and the type of data needed for the MMR. The rationale for using focus groups will be discussed in the next section.

3.7.1 Rationale for Using Focus Groups

A focus group is a qualitative research method where a small group of participants discuss a specific topic, guided by a moderator. The pros and cons of using focus groups was discussed in Section 3.7 but they work best when the goal is to explore collective viewpoints rather than individual experiences as is the case with this research. The key to a successful focus group is strong moderation, ensuring balanced participation and a comfortable environment for open discussion.

A focus group was regarded as the best way of obtaining deeper informative data that uncovered the underlying reasons behind the answers not captured in the quantitative phase of the study (via questionnaires). This is possible as the participants can verbally explain and expand on their views of the health brief in the focus groups. The focus group approach directly addressed the overall research aim; to explore the attitudes and behaviours of military personnel towards a pre-deployment training health intervention (the health brief) designed to reduce DNBI on operational tours overseas. The focus groups aligned with the

research objectives to be realised, particularly getting explanations from participants about their reasoning for risk-taking behaviours, willingness to change behaviour or their attitude related to their health during their deployment.

The focus groups enabled a detailed description of the conditions experienced by the participants in Iraq which was missing from the questionnaires, thereby contributing to contextual understanding. Kitzinger's (1995) work looked at how focus groups are particularly suited for exploring data given on experiences and how participants responses are framed in relation to group norms. The purpose of carrying out focus groups with the military personnel in this study, is to encourage interactions that reveal how shared attitudes toward the health brief drove health-related behaviours. Morgan (1997) concluded that focus groups were effective at understanding 'socially constructed phenomena' where the participants discuss real life social contexts such as whether the group in this study thought the health brief was effective. Organising focus groups for this cohort allowed the researcher to collect the attitudes and beliefs which provided the background data and overall views from each participant, per focus group which was time and cost effective but also provides rich data. Focus groups can gather diverse viewpoints in a single session, making them practical for exploratory research (Wilkinson, 2004). The participants in each focus group spent the previous six months working in a confined space with other Military personnel, and as such would have a bond with those who deployed which is advantageous as it creates a comfortable environment for open discussion. In this study, this approach could have helped Military personnel to be more open especially when answering more sensitive questions such as their risk-taking behaviour. Rabiee (2004) described the empowerment of participants as focus groups create a safe space, encouraging them to express their views more openly, especially when they feel supported by their peers.

Litosseliti (2003) noted that a researcher may have to consider the size of a focus group due to practical constraints such as the size of a room, location and time constraints. There was a large room available for the focus groups to be conducted in, but the location was a constraint and will be discussed in the limitations section below.

In summary, the focus group approach was instrumental in fulfilling the research aims. It provided a deeper exploration of why this cohort had the attitudes they did towards the health brief, in an interactive and efficient way whilst also considering the cultural norms in the military and the factors like the conditions on tour. The focus group participant numbers and composition complimented the academic recommendations that align with established qualitative research practices.

3.7.2 Study design

Three focus groups were conducted, stratified by rank: Officers, Senior Non-Commissioned Officers (SNCOs), and Junior Non-Commissioned Officers (JNCOs) and Privates. Each group comprised six participants (n = 18).

Stratifying by rank was not only a practical decision but an analytical one. It allowed exploration of whether perceptions of the intervention were shaped differently across hierarchical levels and reduced the likelihood that lower-ranked personnel would moderate their responses in the presence of senior ranks. This design therefore supported the generation of data that reflected rank-specific norms as well as shared organisational narratives.

3.7.3 Sampling Strategy.

The sampling strategy is a crucial aspect of qualitative research, determining how participants are selected to provide meaningful insights. Opportunity/ convenience sampling was considered for this research as it involves selecting participants who are readily available at the time of the study. When the flight from Iraq arrived it would have been convenient to select those first to disembark, allowing the researcher to quickly gather data without the need for extensive planning (Etikan, Musa and Alkassim, 2016). However, the major drawback is that this would lack representativeness, meaning the sample may not reflect the broader population (Etikan, Musa and Alkassim, 2016). This can lead to biased findings, reducing the generalizability of the research.

Therefore, purposeful sampling was a better strategic approach to use, where the researcher intentionally selected participants based on specific criteria that align with the study's objectives (Palinkas et al., 2015). Instead of choosing participants based on convenience, the researcher identified military personnel by rank who could provide rich, relevant, and diverse insights into the topic. This method is widely used in qualitative research, especially in studies requiring in-depth exploration of experiences, behaviours, or perspectives (Patton, 2015). The main advantage of purposeful sampling is that it ensures information-rich cases, meaning participants are chosen because they can contribute meaningful data to the study (Creswell and Poth, 2018). However, a limitation is that researcher bias can influence participant selection, and findings may not be widely generalisable (Etikan, Musa and Alkassim, 2016). This bias was reduced as the researcher chose the participants based on rank on the flight manifest rather than seeing/speaking to the participant prior to the focus group.

3.7.4 Participants

The participants were recruited per focus group due to it being a manageable group size, which was small enough to encourage participation and regulate group dynamics, but large enough to give diverse viewpoints. A group of five to eight participants is generally recommended for effective discussions to take place without separate conversations breaking out (Krueger and Casey, 2015) or participants being overlooked or excluded from the conversation (Wilkinson, 1998). Smaller groups will allow participants to engage more deeply and reduce the likelihood of dominant voices overshadowing quieter participants (Morgan, 1997) and also feel a sense of 'safety' to give their honest opinion (Rabiee, 2004). There were three focus groups in total as the participants were selected by rank category: Officers, SNCO's and JNCO's. Participants in the different rank categories traditionally (but not always) come from slightly different socio-economic and educational backgrounds, with Officers requiring a degree level qualification to commission as an Officer. The different rank categories used in the focus groups offered a diversity of viewpoints which provided a richness of data.

3.7.5 Data Collection Methods.

The method of data collection was via focus groups which took place in the “Quiet Room” in the Decompression Reception Centre in Akrotiri. Each focus group lasted approximately one hour and audio-recorded with consent. Recordings were transcribed verbatim to preserve the detail of interaction, including agreement, hesitation, and contestation between participants, features that are analytically important in focus group data.

A semi-structured topic guide (Appendix C) was used to balance consistency across groups with flexibility to pursue emergent issues. This approach allowed the discussion to remain anchored to the research aims while still capturing unanticipated perspectives, particularly around institutional influence, operational pressures, and informal norms shaping health-related behaviour.

At the outset of each focus group, participants were briefed on the purpose of the study and engaged in agreed ground rules. These were not treated as procedural formalities but as part of shaping the social conditions of the discussion, particularly around respect, turn-taking, and confidentiality. Participants were explicitly informed that, while data would be anonymised and securely managed by the researcher, confidentiality within the group could not be guaranteed due to the collective nature of the method.

The focus groups were facilitated by the lead researcher, whose familiarity with the military environment supported rapport and helped navigate rank-sensitive dynamics. This positionality was particularly relevant in encouraging open discussion in a setting where participants may otherwise be cautious about expressing views that diverge from perceived institutional expectations.

Inclusion criteria: The inclusion criteria were all Military personnel (including Reservists) who deployed on the operation whether they received a health brief or not. The population demographic characteristics for inclusion were military personnel aged between 18-40 years old, all ethnic backgrounds and gender with a variety of professions found in the British military. Participants were selected regardless of their previous operational experience

Exclusion Criteria: Any civilian contractors and personnel who did not deploy are excluded as this is not the population of interest.

Ethical considerations

Ethical approval was granted in line with institutional requirements and aligned with standards from the British Psychological Society and the Health Research Authority. Written informed consent was obtained from all participants.

Participants were informed that participation was voluntary and that they could withdraw at any time without consequence. However, it was also made explicit that the interactive nature of focus groups limits the extent to which individual contributions can be removed once shared, particularly after transcription and anonymisation. This boundary reflects an important ethical tension in group-based qualitative methods between individual autonomy and collective data production.

3.7.6 Data Analysis (Thematic Analysis).

There are several forms of techniques of qualitative analysis that researchers use to analyse and make sense of qualitative data. Thematic Analysis (TA) which was developed by Braun and Clarke, was used in this study as it focuses on identifying and analysing patterns of themes or topics within qualitative data and exploring their significance (Braun & Clarke, 2006). In TA, themes are actively 'found' by researcher and are built/created rather than being pre-existing.

In applying thematic analysis to the data, the following six steps were taken to ensure a comprehensive and systematic approach to analysing the views of military personnel on health interventions. The author began by transcribing the focus group recordings and carefully reading through each transcript multiple times to become familiar with the data. During this process, detailed notes were taken on initial impressions and potential themes that emerged. This helped to build a solid understanding of the data and prepare for the coding stage. The data were then systematically coded, identifying significant phrases or

segments that related to the research questions. Codes were assigned to phrases such as "we all know how to look after ourselves" and "I couldn't hear a thing". The use of NVIVO helped manage the codes and ensure that no data were overlooked. After coding individual phrases, the related codes were grouped into broader themes. Codes that related to communication barriers were grouped into the theme "Barriers to Effective Engagement," while those referring to positive support were grouped under "Perceived Benefits of the Health Intervention." These were reviewed and the connections mapped out to show how the codes linked to form broader patterns. The themes were reviewed to ensure their consistency and relevance. Some themes, such as "Barriers to Effective Engagement," were split into sub-themes, including "Mistrust" and "Lack of Information." This refinement process ensured that each theme was adequately supported by the data and accurately represented the participants' views. Each theme was defined and clearly named. "Barriers to Effective Engagement" was defined as the range of factors that hindered military personnel's full participation in the health intervention. Other themes, such as "Support for the Intervention," were described as factors that encouraged participation, such as clear communication and perceived effectiveness. The themes were named concisely to reflect their core meaning. In the final stage, the author wrote up the analysis, structuring the report around the key themes. Each theme was explored in depth, supported by direct quotes from participants to illustrate the findings. This narrative highlighted how the themes addressed the research questions and provided insights into the views of military personnel regarding the health brief.

By following these six stages, a thorough and organised approach to data analysis was produced, identifying the rich and meaningful understanding of the participants' experiences and perspectives.

3.7.7 Reliability and Validity

MMR follows a Pragmatic Paradigm, which emphasises "what works" to address the research questions. This means justifying how reliability, validity, and trustworthiness are handled in both studies and in their integration (Morgan, 2007). This thesis uses triangulation

of the results to achieve this. The triangulation involved taking the findings from the qualitative study and cross-validating them with the quantitative themes. Triangulation strengthens both reliability and validity by confirming results through multiple lenses (Denzin, 1978). Triangulation of the data were a critical part of this research as it aims to combine the quantitative and qualitative studies to provide a comprehensive understanding of the research question. According to Creswell and Plano Clark (2018) triangulation is used to validate findings by comparing the data (convergence), explore complementary insights, resolve any inconsistencies between the datasets (inconsistency resolution) and to broaden the scope and depth of understanding (expansion). The triangulation plan for the studies in this thesis involved designing the triangulation framework, detailing how the data would integrate, create an analysis plan and triangulate the findings. There were then validity and reliability checks and thought into presentation of the results. Areas that were considered in the design of the studies involved the data collection methods and the timing of the data collection (i.e. that the studies were sequential). The data were integrated by carrying out a side-by-side comparison from both studies on the key themes. The analysis plan aimed to do a comparative analysis.

The author ensured that the reliability and validity in the quantitative study and the trustworthiness in the qualitative study was upheld. For the quantitative part of the MMR, reliability refers to the consistency of measurements (Tavakol & Dennick, 2011) such as the test-re-test reliability or internal consistency like Cronbach's alpha). In this MMR study, the quantitative measures aligned with the research questions and the qualitative data they triangulated with.

The internal validity here meant checking that the quantitative findings corroborated the qualitative themes. This was achieved by using the same five themes throughout, which were: behaviour change, attitudes, delivery, illness suffered and risk taking. The external validity considered the generalisability of the findings. MMR enabled the author to examine the generalisability at a deeper level as the quantitative data were enriched by the qualitative cohort discussions, providing insights through understanding the context of the operational

tour and the participants. Integration validity is specific to MMR and refers to the extent to which the findings are integrated with each other to provide a cohesive and meaningful interpretation (Tashakkori & Teddlie, 2010).

Trustworthiness in the qualitative study was ensured by considering the credibility, dependability, confirmability and transferability of the studies. Credibility ensures that the research findings accurately reflect participants' experiences and are believable (Lincoln & Guba, 1985). In this study, credibility was established by comparing data from multiple sources (the questionnaire results and focus group discussions). When these different sources led to similar conclusions, it reinforced the reliability of the findings.

Dependability relates to the consistency of the research over time and across similar contexts (Guba & Lincoln, 1989). To maintain dependability, coding decisions were recorded using the notes section in NVIVO. This provided a clear audit trail, allowing future researchers to follow the same analytical process and achieve comparable results.

Confirmability ensures that findings are shaped by participants' responses rather than researcher bias (Lincoln & Guba, 1985). This study strengthened confirmability through triangulation, using two different sources of data to validate interpretations (Shenton, 2004).

Transferability refers to the extent to which findings can be applied to other contexts or groups (Lincoln & Guba, 1985). Unlike quantitative research, qualitative studies do not aim for broad generalisability but instead provide rich, detailed descriptions to allow others to assess relevance. Detailing the research setting, participant characteristics, and contextual factors, enhanced transferability in this study (Shenton, 2004). For example, findings on military personnel's perceptions of health interventions may be relevant to other high-pressure professions such as policing or emergency response, where similar structures and challenges exist. Credibility, dependability, confirmability, and transferability establish the trustworthiness of qualitative research, ensuring that findings are rigorous, transparent, and meaningful.

This MMR research used an exploratory sequential design, so it was critical that insights from the quantitative study guided the qualitative questioning route in a logical and

transparent way which demonstrated dependability of the study. The study was able to be confirmable as the data from both study strands corroborate each other. In MMR, transferability benefits from the dual perspectives.

In addition to triangulation of the findings mentioned earlier, other unique consideration when following a MMR approach are Meta-Inferences. This refers to the overall conclusion drawn from integrating the data from both studies. The validity of the Meta-Inferences is critical and depends on how well the two studies complement and enrich each other (Venkatesh et al., 2013).

Table 7 gives a summary of key triangulation considerations.

Area	Quantitative Study	Qualitative study	Integration (MMR)
Data Integration	Questionnaires	Focus Groups	Align the questions in the questionnaire with the focus group questioning route.
Analysis Plan	Descriptive Statistics Statistical testing Statistical modelling	Thematic analysis	Side-by-side comparison
Triangulate Findings	Identify statistical significance	Explore contextual depth and nuances	Convergence, divergence, synthesis
Validity & Reliability Checks	Reliability and validity tests	Credibility, dependability and transferability	Integration validity
Results Presentation	Tables showing numerical data	Themes (behavioural Change, Attitudes, Illness and risk taking)	Explanation of the areas of divergence and integration

3.8 Ethical Considerations

The ethical treatment of the participants who volunteered to take part in this research was of great importance and considered at every stage of the research. The Researcher was aware of what the participants had endured over their 6-month tour from personal experience and used sensitivity when addressing them. There is also a “duty” for researchers to “...consider how the work they undertake, host or support, impacts on the research community and on wider society” (UUK Concordat to Support Research Integrity, 2019).

Research Ethics Approvals

This research generated qualitative and quantitative primary data (new knowledge) so required ethical approval (BCU ethics guidelines). Two research proposals were submitted (see Table 5) to Birmingham City University Ethics Committee. Approval to carry out the quantitative research was given in May 18 (Review Reference: Willoughby /1274 /R(C) /2018 /Jun /HELS FAEC) (see Appendices H), and to carry out the qualitative research in Jun 19 (Review Reference: Willoughby /1986 /R(C) /2019 /Jun /HELS FAEC).

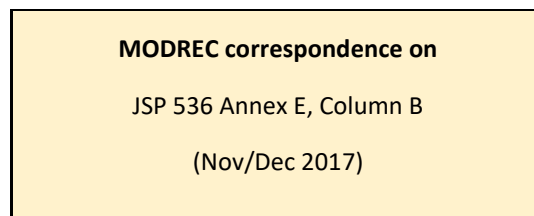
The research proposal was subjected to ethical review following procedures in place at Birmingham City University. There were clarification questions from the Ethics Committee about the age of the participants and if any of them were under 18. To deploy on an operational tour a service person must be over 18 years or older, so this was confirmed for the committee.

In addition to BCU REC approval the author also approached the MoD Research Ethics Committee (MoDREC). Joint Service Publication (JSP) 536 Annex E was consulted, and responses fell into Column B as a service evaluation which did not require MODREC submission. This was reviewed by the MODEC Secretary, who concurred with the categorisation provided (see Appendices J). The MODREC Secretary advised that the final decision as to whether MODREC review was required rested with the study’s military mentor and supervisory team. This assessment was made and the military mentor recommended this classification, which was confirmed by the supervisory team (see Appendices J). The author acknowledges that this research subsequently generated original primary data

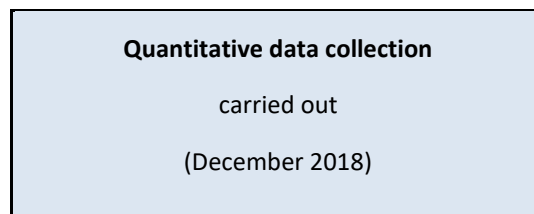
intended to contribute new, generalisable knowledge, as required of a PhD, and that this sits in genuine tension with a Service Evaluation classification. The author acknowledges this as a limitation of the ethical governance and is a lesson learnt for future research.

Table 5: Ethics Approval and Data Collection Timeline.

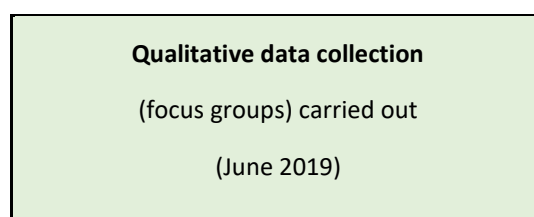
Research Governance



Quantitative Study



Qualitative Study



Note: for both phases of the research, formal BCU ethics approval was granted prior to the commencement of data collection.

The Belmont Principles (The Belmont Report, 1979) were considered prior to and during this study design as follows.

Consent was requested from the participants once they had the opportunity to read the participant information leaflet. Respect for their privacy was considered as some of the questions had a medical in confidence aspect to them. The participants completed the questionnaire on an iPad individually at a desked survey area away from the check in staff and other participants to ensure privacy. The participant's well-being was considered as they completed the survey after they had checked in their baggage, reducing the burden of carrying their heavy military kit. The participants were treated fairly and spoken to the same, regardless of their rank. A data leak was avoided as the data were collected using iPads which were password protected and then downloaded onto a password protected computer excel database.

The principles outlined in the BPS "Code of Human Research Ethics" (2021) were also adhered to in this research study as follows:

Respect for the autonomy, privacy and dignity of individuals was achieved by ensuring participants made their own fully informed decision to participate in the research, after they were provided with adequate information about the research and their rights as a participant such as confidentiality, consent, and withdrawal.

Scientific integrity was ensured through the process of obtaining ethical approval, in which the design and rationale for the research were independently scrutinised and confirmed. The participants will benefit from this research as they are likely to deploy again in the future and will therefore benefit from any recommendations made when the study is completed. The recommendations will result in further disease, illness and injury prevention interventions, which could reduce their risk of Disease Non-Battle Injury on operational tours. This research also aims to have broader cultural implications within the military, which involves

Military personnel putting a greater importance on protecting their own health and those they are responsible for.

There are also benefits to the wider population as this research will benefit all military personnel by improving current health preparation demonstrating social responsibility.

This research aimed to maximising benefit and minimising harm. While generating knowledge that would be of benefit, it was of utmost importance to safeguard the well-being of research participants as previously discussed. The personal security of the military personnel and the British military reputation also need to be protected.

Ethics councils state that informed consent must be obtained from participants prior to any research. The Council for International Organizations of Medical Sciences (CIOMS)

International Ethical Guidelines for Health-related Research Involving Humans Ethical approval, states that this involves providing participants with “comprehensive information about the research study, allowing them to make voluntary and informed decisions about their participation” (CIOMS, 2016). Adhering to these guidelines, a patient participation leaflet was produced (Appendices) and given to the participants no less than 30 minutes before they went to the airport to check in their baggage and potentially complete the questionnaire. The Researcher was at the staging post and the airport if there were any questions and was responsible for obtaining consent via the iPad from the participants.

The participant's Chain of Command (CoC) were not involved in any of the data collection process, which eliminated any pressure they may have placed on the individual to complete the survey. The participants were given a consent form to complete on the iPad before answering any questions. The participants were able to withdraw at any time throughout the process without having to give an explanation.

Confidentiality was maintained throughout as the participants completed the questionnaires on iPads individually with no onlookers permitted. The questionnaire did not have an identifier (such as name or Army service number) so will therefore remain anonymous. In addition, there was attention given to ensuring there was no coercion from higher ranks at

the location where the iPads were set up. Several specific measures were taken to reduce the risk of coercion, particularly given the hierarchical nature of the military context. First, the participant's Chain of Command was deliberately excluded from the data collection process entirely; they were not present, involved in administering the questionnaire, or informed of who had or had not participated, which removed the most direct route through which pressure could have been applied. Second, consent and completion were handled individually and privately: participants completed the questionnaire on an iPad, with no onlookers permitted, at a staging point ahead of an unrelated administrative task (baggage check-in), rather than in a setting organised or observed by superiors. This reduced the visibility of who chose to participate, decline, or withdraw, limiting any social pressure that visibility might otherwise create. Third, the questionnaire was anonymous, containing no identifying information such as name or service number, and participants were explicitly informed they could withdraw at any point without needing to provide a reason. This was reinforced by the Participant Information Leaflet, provided at least 30 minutes before participation was invited, giving individuals time to consider their decision away from the point of recruitment itself. However, these measures reduce, rather than eliminate, the risk of coercion. The near-universal uptake is plausibly explained however by the practical context of recruitment than by coercion: participants were approached whilst waiting at the staging post ahead of their flight home, a period in which they had little else to occupy their time, and completing a short questionnaire on an iPad likely represented a low-effort, no-cost to them way to pass that waiting period. This does not remove the need for the procedural safeguards described above, but it explains the response rate rather than an assumption of hierarchical pressure.

3.9 Data Management.

The researcher was responsible for the data throughout, including data storage, which followed BCU guidelines, which relate to the Data Protection Act, 2018, aligned with the GDPR, and ensured compliance with the General Data Protection Regulation. The Researcher is the only person to have access to the data.

Data were collected online using an electronic device with the questionnaire loaded on it. The collection tool used for the questionnaire data (the Bristol Online Survey) is deemed secure and is approved for use by BCU. The data will be stored on an encrypted Laptop. Any participant can request a copy of the (anonymised) data collected and/or the outcomes under the Freedom of Information Act 2000. Participants were made aware of this via the Participant Information Leaflet.

Consideration was given to the researchers rank and profession (medical trade) with respect to any possible bias. To mitigate for this the researcher used a relaxed and informal style when addressing the participants and stated that it was not necessary to make any reference to ranks during the discussions. An example of coercion and how the researcher being a Officer could have influence participants engagement was seen when a JNCO was describing an incident and how his Sergeant Major had given him an order that he did not think was appropriate. The JNCO had no hesitation in telling the story, indicating to the Researcher that they were comfortable in this safe surrounding.

3.10 Limitations of the Methodology

There are always limiting factors involved in every methodology but recognising and addressing these enhances the credibility of the research. This section will tackle the limitations involved with quantitative and qualitative studies and those specific to MMR.

There are also some universal methodological limitations that will be mentioned.

It was decided at an early stage that the most effective way of addressing the research question in this study would be to use MMR approach, but this resulted in complexities associated with the design and implementation, especially how the results would be triangulated. From a philosophical viewpoint, there are arguments that the underlying philosophical assumptions between the methods conflict, complicating their integration (Lincoln & Guba, 1985). The author's view is that these are complemented as they allow for a deeper exploration to the reasons why and contextualisation of the environment the participants are in. Tashakkori & Teddlie (2010) affirmed that in MMR, balancing both quantitative and qualitative methods can be time-consuming and resource intensive, which

was agreed by Creswell & Plano Clark (2018), who stated that MMR requires more funding and expertise compared to a single-method study. It was identified that the author would require further training in qualitative methodologies prior to commencing this study, which Cameron (2011) also expressed may be the case. The author addressed this by completing a NVIVO course, personal study and attending various other online sessions through her university. The resources required to carry out the field work for both these studies included extensive planning and coordination of travel plans. The author had to organise ‘trooping’ flights which coincided with Military personnel in the study groups arriving in Akrotiri. To collect the data for both studies the author had to get access to restricted information on when the flights were planned and the Military personnel who were on each flight. This required a high security clearance and access to a secret account which the author did not have at the time. It was necessary to request assistance from the Chain of Command to be able to access the secret information. A limitation that involved ‘uneven emphasis’ which is where one method is unintentionally favoured over another, leading to bias or incomplete interpretation was a real worry in this study. This was because the authors previous research was purely quantitative (as discussed in the personal stance section of this Chapter) but this was addressed by allocating the same amount of time to analyse the results for both studies. The ethical concerns were also addressed as there was potential for the participants to feel uncomfortable with follow-ups from one phase to another but in this study different participants were recruited for each study.

The researcher ensured that participants were able to complete the questionnaires with privacy to prevent any social desirability bias if a peer could see their answers, but this could still present a limitation to using questionnaires, as participants in this military cohort may provide responses they perceive as socially acceptable rather than their true attitudes or behaviours (Podsakoff et al., 2003). The reasons for this lie within the peculiarities of military life with its strict hierarchy and individuals feeling a collective responsibility. Peer pressure for military personnel can stem from “a culture where unity and mutual trust are critical” (Frontiers, 2023) resulting in the answers to the questions being what they perceive their

hierarchy and peers would like them to respond. The author attempted to reduce the social desirability bias by carefully wording the questions (based on the original Operational questionnaire to be discussed later) and putting the answers into context during the analysis (Creswell, 2014).

A limitation with the focus group design however is if all participants ('peers') taking part are not deemed as being equal. This was a limiting factor that needed to be considered especially due to the influence of military hierarchy. This was identified in one of the focus group Officer cohorts as one of the participants held a role that had a lot more responsibility than the others, despite being the same rank as the other participants. Behaviour that was observed by the researcher was that initially participants would look to this individual whilst they were giving their viewpoint as if to seek his agreement or approval. This behaviour stopped though as the focus group went on and the participants got more confident. The researcher also tried to make the participants feel confident that they all had a valid opinion throughout the focus group. To mitigate for this potential bias, the researcher had ensured that all participants were of the same rank but did not account for the unofficial hierarchical structure involved in different roles. Additionally, the researcher gave an introduction at the beginning of the focus group which mentioned that all comments were anonymous. There is also a risk with focus groups that one person will domineer the conversation or "Groupthink" which is a phenomenon where participants align their views with dominant voices (Carey & Asbury, 2012). This can affect the data and happened within the SNCO Cohort. In this instance the researcher made sure that other participants were given an opportunity to give their view by indicating to them and asking them directly if they had anything to add. This was successful in the SNCO focus group as the dominate voice was given a turn rather than commandeering the whole conversation.

As mentioned previously, the logistics involved in running the focus groups had to be considered. Practical constraints included using a "Quiet Room" to carry out the focus groups which was open for all to use and as such, one of the groups was disturbed briefly by someone entering the room despite a notice on the door (Litosseliti, 2003). There was also a

time “hard stop” due to the participants flight time but the focus groups concluded naturally without having to rush.

3.11 Methodology Summary

The key methodological decisions were to use a critical realist paradigm, a MMR methodology using quantitative questionnaires and qualitative focus groups for this research. The next chapter will present the results of the studies.

CHAPTER 4 – RESULTS

QUANTITATIVE STUDY RESULTS

4.1 Introduction.

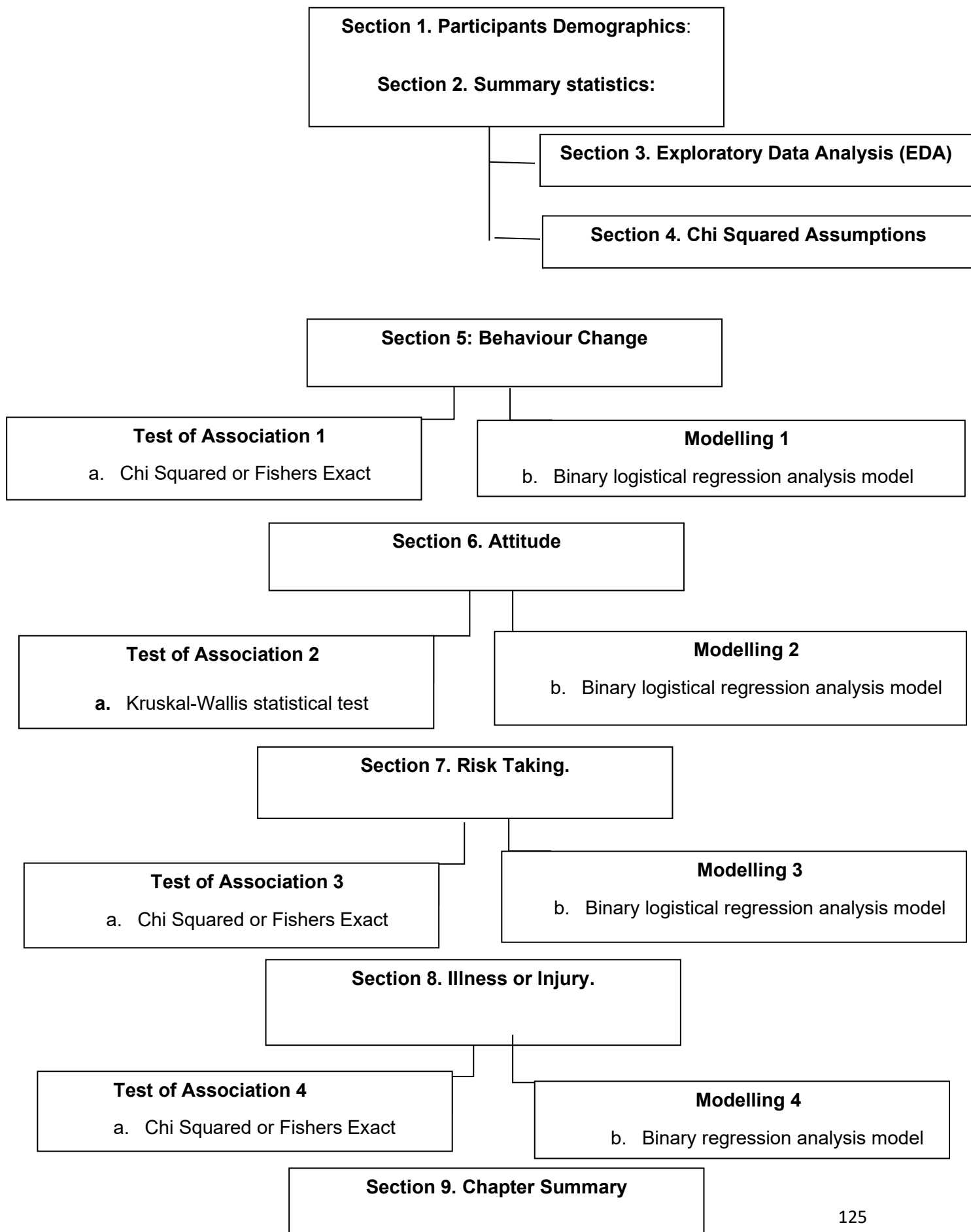
The rationale for using Mixed Methods Research (MMR) methodology has been discussed in Chapter 3 - Methodology, with the first step being a cross-sectional quantitative study using questionnaires to collect the data. This preceded the qualitative study results using focus groups, which will be presented in Chapter 5.

This chapter will provide the results of the data collected.

4.2 Analysis Plan.

The data will be analysed in order to determine if certain demographic or behavioural characteristics predict behaviour change as a result of the PDT health brief in line with the key aims of this thesis.

4.3 Analysis Plan Flow Chart.



Further detail on the analysis plan will now be provided:

Section 1. Participants Demographics: This section gives details of the study's sample population of military personnel from the British Army including demographic data (age category, ethnicity, Joint Medical Employment Status (JMES), Service or Corps, educational level and the number of operational tours completed in their career) by number and of participants and percentage breakdown.

Section 2. Summary statistics: These provide a numerical summary of the data provided from each question. This "enables the reader to understand the context of the study sample, and which ultimately assists with interpretation of the data" (Coolican, 1999).

Section 3. Exploratory Data Analysis (EDA): An initial EDA will be performed to visualize distributions, detect any missing data patterns, and assess normality for relevant continuous variables.

Section 4. Chi Squared Assumptions: This section details how the 4 Chi Squared assumptions were met.

For all of the Chi Squared tests, where more than 20% of expected frequencies fell below 5 Fisher's Exact test was used as an alternative

Section 5. Test of Association 1 – Behaviour Change:

- a. Chi Squared (or Fishers Exact if the cell numbers were small) statistical test was used to report an association between participants who believed they adopted or changed a health practice and the other independent variables (participant demographics and other questions).
- b. A regression analysis model was used to predict the dependant variable (behaviour change) and other independent variables (participant demographics and other questions). Effect sizes will be reported for all tests, including odds ratios for regression models.

Section 6. Test of Association 2 – Attitude:

- a. Kruskal-Wallis statistical test was used to report an association between the attention a participant paid to the health brief and the other independent variables (participant demographics and other questions). The Kruskal-Wallis test was used due to non-normal distribution of attention levels and the ordinal nature of the variable, where parametric alternatives like ANOVA would not be appropriate.
- b. A regression analysis model was used to predict the dependant variable (Paying Attention) and other independent variables (participant demographics and other questions).

Section 7. Test of Association 3 – Risk Taking:

- a. Chi Squared (or Fishers Exact if the cell numbers were small) statistical test was used to report an association between participants who believed they took a risk with their health and the other independent variables (participant demographics and other questions).
- b. A regression analysis modelling for the dependant variable (risk taking) and other independent variables (participant demographics and other questions).

Section 8. Test of Association 4: Illness or Injury:

- a. Chi Squared (or Fishers Exact if the cell numbers were small) statistical test was used to report an association between participants who had an illness or injury whilst on tour and the other independent variables (participant demographics and other questions).
- b. A regression analysis modelling for the dependant variable (illness) and other independent variables (participant demographics and other questions).

Section 9. Chapter Summary: This section summarises the result key findings.

4.4 Quantitative Results

4.4.1 Section 1: Participants Demographics

The participant demographic data provide the responses from the sample population about their demographic background (column 2 being the number of participants in each category and column 3 depicting this as a percentage).

This information aims to support the intent that the cross-sectional sample population is representative of the British Army as previously discussed in Chapter 4 (Methodology: Practical Application)

Table 8: Participant Demographics

	n = 295	% n
Age Category		
18-25	141	47.8
26-30	87	29.5
31-35	36	12.2
36-40	24	8.1
Over 40	7	2.4
Ethnicity		
White	283	95.9
Black	8	2.7
Asian	2	0.7
Mixed Ethnicity	1	0.3
Other	1	0.3
Corps		
AAC	1	0.3
AGC	7	2.4
AMS	9	3.1
Infantry	188	63.7
RE	62	21.0
REME	7	2.4
RSigs	6	2.0
Int	1	0.3
RLC	2	0.7

RN	1	0.3
RAF	11	3.7
Educational Qualifications		
No Qualifications	13	4.4
Level 1 & 2 (Num & Lit)	66	22.4
Level 3 (Certificate)	5	1.7
Level 4 (GCSE's)	117	39.7
Level 5 (A Levels)	51	17.3
Level 6 (Diploma/ Degree)	32	10.8
Level 7 (Masters)	8	2.7
Level 8 (PhD)	0	0
Missing data	3	1.0
Joint Medical Employment		
Standard (JMES)		
MFD	279	94.6
MLD	9	3.1
MND	2	0.7
I don't know	5	1.7
Previous Operational		
Tours		
1 – 2	202	68.5
3 – 4	56	19.0
5 or more	37	12.5

4.4.2 Section 2: Summary Statistics.

The responses from questions 7 to 23 are presented using the frequency and percentage of answers to each question to give the summary statistics.

Table 9: Descriptive Statistics

Question	Frequency	%
7. Do you remember receiving a health brief?	n=295	
Yes	216	73.2
No	26	8.8
Can't remember	51	17.3
Don't know	2	0.7
8. Do you think there is a need for the health brief?		
Yes	227	76.9
No	44	14.9
Don't Know	24	8.1
9. When should it be given?		
Before every operational tour	197	66.8
During every operational tour	15	5.1
Just on the high tempo tours	56	19.0
Before a person's first tour only	14	4.7
I do not think the brief is needed at all	13	4.4
10. How many days had you been in Theatre when you received another health brief?		
I did not receive a second health brief	132	44.7
First Day - 1 month	95	32.2
2 - 3 months	29	9.8
4 -5 months	9	3.1
After the 5-month point	30	10.2
11. Overall, on a scale of 1-5 how much attention did you pay to the brief?		
No Attention – 1	24	8.1
Not Much Attention – 2	72	24.4

Neither Attentive nor Not Attentive – 3	106	35.9
A Little Attention – 4	60	20.3
Very Attentive – 5	32	10.8

12. What do you think about the length of the health brief during your PDT?

Too Long	95	32.2
About Right	186	63.1
Too Short	12	4.1
Missing data	2	0.7

13. Who do you think should deliver the health brief?

Chain of Command	34	11.5
Your Line Manager	2	0.7
A Peer or Friend	8	2.7
Health Professional Not Attached to Your Unit	84	28.5
Your Own Regimental Medical Officer (RMO) or Unit	155	52.5
Medic		
A Local Person of The Country You Deploy To	6	2.0
Other	5	1.7
Missing data	1	0.3

14. Do you think the health brief should be delivered in groups according:

Rank	35	11.9
Operational Experience	25	8.5
Age	9	3.1
Those From a Medical Background	12	4.1
Size (individual, smaller or larger groups)	27	9.2
I Have No Preference	186	63.1
Missing Data	1	0.3

15. Which do you think is an appropriate venue for the health briefs?

Lecture Theatre	170	57.6
Classroom Based	53	18.0
In A Medical Setting (such as the Medical Centre)	20	6.8
Social Setting	35	11.9
Computer Based E-learning	3	1.0
Other	13	4.4
Missing Data	1	0.3

16. Did you know how to protect yourself against illness and injury on the operational tour after the health brief?

Yes	274	92.9
No	8	2.7
Not Sure	12	4.1
Missing Data	1	0.3

17. Overall, what number would you use ⁽¹⁻⁵⁾ to rate the health brief

V Poor – 1	14	4.7
Poor – 2	41	13.9
Neither Good Nor Bad – 3	131	44.4
Good – 4	83	28.1
Excellent – 5	24	8.1
Missing Data	2	0.7

18. Did you adopt a practice/ change your usual routine as a result of the health brief?

Yes	67	22.7
No	185	62.7
Not sure	41	13.9
Missing data	2	0.7

19. Did you take a “risk” to your health even though you knew the possible result?

Yes	78	26.4
No	173	58.6
Not Sure	43	14.6

20. If yes, what was this risk?

Not Carrying Out Advised Sanitation Procedures (like washing hands before eating)	36	12.2
Not Taking Medication As Advised	2	0.7
Not Using Personal Protective Equipment (PPE)	7	2.4
Eating Local Food	17	5.8
Drinking Local Water	4	1.4
Swimming In Local Water	1	0.3
Being Sexually Active With Sex Workers	2	0.7
Playing Contact Sport	11	3.7
Other	21	7.1
Total	101	34.2

21. Did you suffer from an illness or injury whilst on tour?

Yes	67	22.7
No	227	76.9
Missing data	1	0.3

22. If so, which category would you put your illness or injury

Ligament, Tendon or Muscle Damage	31	10.5
Broken Bone(s)	1	0.3
Stomach Cramps	7	2.4
Diarrhoea & Vomiting	13	4.4
Toothache	4	1.4
Skin problem	2	0.7
Sore throat	3	1.0

Cough	1	0.3
I Prefer Not to Say	6	2.0
Total	68	23.1
Not applicable	227	76.9
23. If so, did you report this illness or injury to the Medical Facility?		
Yes	51	17.3
No	15	5.1
Can't Remember	1	0.3
NA	228	77.3

4.4.3 Section 3. Exploratory Data Analysis (EDA).

An initial EDA was performed to visualise distributions, detect any missing data patterns, and assess normality for relevant continuous variables. The EDA charts gave an early insight into relationships between behaviour change and variables.

4.4.4 Section 4. Assumptions.

The data were tested using Chi Squared statistical test and prior to this the 4 assumptions for Chi Squared test were met.

Assumption 1: The tests run involved the dependant variable being categorical data.

Assumption 2: All the observations were independent of each other.

Assumption 3: The cells are mutually exclusive.

Assumption 4: The expected value of all the cells were 5 or greater in at least 80% of cells. If not, Fishers Exact Test was used. Fishers Exact Test can analyse small samples which can be found in these data (for example the sample in the cells that refer to ethnicity or the corps participants are in, contained in these data set). Chi Squared Test uses an approximation method which is inaccurate with smaller numbers, whilst Fishers Exact Test is an exact test which assesses the null hypothesis of independence (Hae-Young, 2017).

4.4.5a Section 5. Test of Association 1 – Behaviour Change:

- a. A Chi Squared (or Fishers Exact if the cell numbers were small) statistical test was used to report an association between participants who believed they adopted or changed a health practice and the other independent variables (participant demographics and other survey factor questions).

There were no associations between the participant demographics (age, JMES, Corps educational level or number of operational tours) and whether they adopted or changed a practice as a result of the Health Brief.

Against the other variables (questions 7 to 23), the following associations were found to be statistically significant:

Table 10: X² test for associations between the “Did you adopt or change a practice as a result of the Health Brief?” and independent variables (Q7-23).

**Q18. Did you adopt or change a practice
as a result of the Health Brief.**

Independent variable	Yes	No	Not Sure	P Value
	%= (n=)	%= (n=)	%= (n=)	
7. Do you remember receiving a health brief?				0.001
Yes	89.6% (61)	75.7% (146)	36.6% (34)	
No	4.5% (3)	9.7% (19)	9.8% (9)	
Can't remember	4.5% (3)	14.1% (28)	53.7% (50)	
Don't know	1.5% (1)	0.5% (1)	0.0% (0)	
8. Do you think there is a need for the health brief?				0.015

Yes	86.6% (58)	77.3%(140)	61.0% (50)
No	10.4% (7)	15.1% (27)	19.5% (16)
Don't Know	3.0% (2)	7.6% (14)	19.5% (16)
9. When should it be given?			0.228
Before every operational tour	76.1% (51)	63.2% (96)	68.3% (56)
During every operational tour	7.5% (5)	5.4% (8)	0.0% (0)
Just on the high tempo tours	11.9% (8)	21.6% (33)	19.5% (16)
Before a person's first tour only	4.5% (3)	4.9% (7)	4.9% (4)
I do not think the brief is needed at all	0.0% (0)	4.9% (7)	7.3% (6)
10. How many days had you been in Theatre when you received another health brief?			0.628
I did not receive a second health brief	35.8% (24)	45.9% (73)	53.7% (44)
First Day - 1 month	43.3% (29)	30.3% (48)	24.4% (20)
2 - 3 months	9.0% (6)	10.3% (16)	7.3% (6)
4 -5 months	3.0% (2)	3.2% (5)	2.4% (2)
After the 5-month point	9.0% (6)	10.3% (16)	12.2% (10)
11. Overall, on a scale of 1-5 how much attention did you pay to the brief?			0.007
No Attention – 1	4.5% (3)	8.1% (13)	12.5% (10)
Not Much Attention – 2	10.4% (7)	30.3% (49)	22.5% (18)
Neither Attentive nor Not Attentive – 3	34.3% (23)	36.8% (59)	35.0% (28)
A Little Attention – 4	31.3% (21)	16.8% (27)	20.0% (16)
Very Attentive – 5	19.4% (13)	8.1% (13)	10.0% (8)
12. What do you think about the length of the health brief during your PDT?			0.002
Too Long	14.9% (10)	37.8% (64)	36.6% (30)

About Right	82.1% (55)	57.8% (98)	56.1% (46)
Too Short	3.0% (2)	4.3% (7)	4.9% (4)

13. Who do you think should deliver

0.247

the health brief?

Chain of Command	14 (20.9%)	14 (7.6%)	5 (12.2%)
Your Line Manager	1 (1.5%)	1 (0.5%)	0 (0.0%)
A Peer or Friend	2 (3.0%)	6 (3.2%)	0 (0.0%)
Health Professional Not Attached to Your Unit	21 (31.3%)	51 (27.6%)	12 (29.3%)
Your Own Regimental Medical Officer (RMO) or Unit Medic	26 (38.8%)	106(57.3%)	23 (56.1%)
A Local Person of The Country You Deploy To	2 (3.0%)	4 (2.2%)	0 (0.0%)
Other	1 (1.5%)	3 (1.6%)	1 (2.4%)

14. Do you think the health brief should be delivered in groups

0.732

according:

Rank	10 (14.9%)	20 (10.8%)	4 (9.8%)
Operational Experience	5 (7.5%)	19 (10.3%)	1 (2.4%)
Age	2 (3.0%)	4 (2.2%)	3 (7.3%)
Those From a Medical Background	2 (3.0%)	8 (4.3%)	2 (4.9%)
Size (individual, smaller or larger groups)	5 (7.5%)	18 (9.7%)	4 (9.8%)
I Have No Preference	43 (64.2%)	116(62.7%)	27 (65.9%)

15. Which do you think is an appropriate venue for the health

0.367

briefs?

Lecture Theatre	45 (67.2%)	97 (52.4%)	27 (65.9%)
Classroom Based	7 (10.4%)	36 (19.5%)	10 (24.4%)

In A Medical Setting (such as the Medical Centre)	4 (6.0%)	15 (8.1%)	1 (2.4%)	
Social Setting	7 (10.4%)	26 (14.1%)	2 (4.9%)	
Computer Based E-learning	1 (1.5%)	2 (1.1%)	0 (0.0%)	
Other	3 (4.5%)	9 (4.9%)	1 (2.4%)	
16. Did you know how to protect yourself against illness and injury on the operational tour after the health brief?				0.002
Yes	65 (97.0%)	175(94.6%)	33 (80.5%)	
No	2 (3.0%)	5 (2.7%)	1 (2.4%)	
Not Sure	0 (0.0%)	5 (2.7%)	7 (17.1%)	
17. Overall, what number would you use (1-5) to rate the health brief				0.001
V Poor – 1	2 (3.0%)	10 (5.4%)	2 (4.9%)	
Poor – 2	5 (7.5%)	32 (17.3%)	4 (9.8%)	
Neither Good Nor Bad – 3	15 (22.4%)	96 (51.9%)	19 (46.3%)	
Good – 4	35 (52.2%)	35 (18.9%)	13 (31.7%)	
Excellent – 5	10 (14.9%)	12 (6.5%)	2 (4.9%)	
18. Did you adopt a practice/ change your usual routine as a result of the health brief?				Independent Variable
19. Did you take a “risk” to your health even though you knew the possible result?				0.001
Yes	25 (37.3%)	44 (23.8%)	9 (22.0%)	
No	35 (52.2%)	124 (67.0%)	14 (34.1%)	
Not Sure	7 (10.4%)	17 (9.2%)	18 (43.9%)	
20. If yes, what was this risk?				0.562

Not Carrying Out Advised Sanitation Procedures (e.g. washing hands)	13 (48.1%)	17 (32.7%)	6 (27.3%)
Not Taking Medication As Advised (0.0%)	0 (0.0%)	0	2 (9.1%)
Not Using Personal Protective Equipment (PPE)	3 (11.1%)	3 (5.8%)	1 (4.5%)
Eating Local Food	3 (11.1%)	10 (19.2%)	4 (18.2%)
Drinking Local Water	0 (0.0%)	3 (5.8%)	1 (4.5%)
Swimming In Local Water	0 (0.0%)	1 (1.9%)	0 (0.0%)
Being Sexually Active With Sex Workers	1 (3.7%)	1 (1.9%)	0 (0.0%)
Playing Contact Sport	2 (7.4%)	6 (11.5%)	3 (13.6%)
Other	5 (18.5%)	11 (21.2%)	5 (22.7%)
21. Did you suffer from an illness or injury whilst on tour?			0.651
Yes	16 (23.9%)	45 (24.3%)	6 (14.6%)
No	51 (76.1%)	139(75.1%)	35 (85.4%)
22. If so, which category would you put your illness or injury			0.023
Ligament, Tendon or Muscle Damage	8 (50.0%)	22 (47.8%)	1 (16.7%)
Broken Bone(s)	0 (0.0%)	0 (0.0%)	1 (16.7%)
Stomach Cramps	0 (0.0%)	7 (15.2%)	0 (0.0%)
Diarrhoea & Vomiting	2 (12.5%)	8 (17.4%)	3 (50.0%)
Toothache	0 (0.0%)	4 (8.7%)	0 (0.0%)
Skin problem	1 (6.3%)	1 (2.2%)	0 (0.0%)
Sore throat	2 (12.5%)	0 (0.0%)	1 (16.7%)
Cough	0 (0.0%)	1 (2.2%)	0 (0.0%)
I Prefer Not to Say	3 (18.8%)	3 (6.5%)	0 (0.0%)

23. If so, did you report this illness or injury to the Medical

0.715

Facility?

Yes	14 (20.9%)	33 (17.8%)	4 (9.8%)
No	2 (3.0%)	11 (5.9%)	2 (4.9%)
Can't Remember	0 (0.0%)	1 (0.5%)	0 (0.0%)
	14 (20.9%)	33 (17.8%)	4 (9.8%)

To note, the significance level alpha (α) which represents the significance level, which is the probability of rejecting a true null hypothesis (Type I error) is 0.05 (5 %). For example if $\alpha = 0.05$, there is a 5% risk of concluding there is an effect when there is none.

Summary of Statistically Significant Associations with Change in Behaviour:

Of the 61 participants who remembered receiving a health brief, 89.6% were more likely to adopt or change a practice (p-value = 0.001).

Of the 58 participants who believed there was a need for the health brief 86.6% were more likely to adopt or change a practice compared to those who did not perceive a need (p-value = 0.015).

Participants who paid more attention (little attention and very attentive) to the health brief were more likely to adopt or change a practice (p-value = 0.007).

Of the 55 participants who found the length of the health brief appropriate (about right) were 82.1% more likely to adopt or change a practice (p-value = 0.002).

Of the 175 participants who knew how to protect themselves on the operational tour 94.6% did not to adopt or change a practice (p-value = 0.001).

Of the 35 participants who rated the health brief as good were 52.2% more likely to adopt or change a practice (p-value = 0.001).

Of the 124 participants who did not take a risk to their health whilst on the tour 67.0% did not adopt or change a practice.

Summary of Variables with No Associations with Change in Behaviour:

None of the demographic characteristics were statistically significantly associated with the participant adopting or changing a practice.

The amount of time in theatre, when a participant received a second brief, venue, group size, who delivered the health brief, reported illness or if they took any risks to their health did not result in any statistical associations.

4.4.5b. Binary Logistical Regression - Behaviour

A binary logistic regression model was run to provide further information into the strength, direction, and significance of the relationships between the dependant variable (which was the participants changing their behaviour as a result of the health brief), and predictor variables such as their demographics or attitudes, risk taking or illness. The models will allow identification of whether there is statistically higher/lower odds of [changing their behaviour] between categories e.g. between demographic groups.

The key reason for choosing a binary logistic regression model over linear regression in this case was its ability to predict a binary outcome, ensuring that predicted probabilities remain within the valid range of 0 and 1, whereas linear regression can produce probabilities outside this range.

The binary dependant variables were categorical with the two values coded as 0 – “Yes” the participant reported that they changed their behaviour as a result of the health brief and 1 – “No” the participants did not change their behaviour, against other predictor variables.

The B (Coefficient) values in the tables to follow represent the coefficients for each predictor in the model. They indicate the direction and strength of the association between the participant changing their behaviour as a result of the health brief and the other dependent variables. A positive coefficient suggests a positive association, while a negative coefficient suggests a negative association. The P-value will be highlighted when it is below the common threshold for significance ($P = 0.05$) suggesting that the predictor is statistically

significant. The Exp(B) title in the tables is the exponentiated coefficient, which represents the odds ratio. Values greater than 1 suggest increased odds, while values less than 1 suggest decreased odds.

The first models run were using the predictor variable of “did not change behaviour as a result of the health brief” against the demographic data. The demographic models were run independently as there was insufficient data in some of the categories to model the covariates together, as it produced results showing errors. As an example, ethnic background was one of these as the majority of the participants were in the “white” category due to the Visa issue mentioned previously.

Overall, the demographics models did not report any statistically significant results, however certain categorical variables within these models did appear significant, indicating that specific subgroups may have an impact on the outcome despite the overall model significance. These will now be demonstrated:

The following binary logistic regression model examines the relationship between the age categories and whether participants did not change their behaviour as a result of the health brief. The reference category for this analysis is the over 40 age group.

Table 11: The odds of a participant not changing their behaviour as a result of the health brief against their age category.

Participants did not change behaviour as a result of the health brief						
	B	S.E.	Wald	Df	Sig.	Exp(B)
Reference category: Age category over 40			5.308	4	0.257	
Age category 18-25 years old	.715	.350	4.169	1	0.041	2.045

Age category 26-30 years old	.218	.441	.245	1	0.621	1.244
Age category 31-35 years old	.838	.586	2.050	1	0.152	2.312
Age category 36-40 years old	.196	.860	.052	1	0.819	1.217
Constant	.720	.200	12.894	1	<.001	2.054

In this age model, overall, the age variable is not statistically significant in predicting the outcome when considering all categories together ($P = 0.26$), however, the 18 – 25-year-old category is $P = 0.04$. The odds of not adopting a change in behaviour was 2.05 times more likely for those in this age group compared to the reference group [over 40 year olds]. Other age categories do not show significant effects individually, although 31-35 age category has an odds ratio that suggests a potential, albeit non-significant, increase in odds ($\text{Exp}(B) = 2.32$).

The next binary logistic regression model examines the relationship between participants ethnic category and whether participants did not change their behaviour as a result of the health brief. The reference category for this analysis is when participants are in the “other” ethnic category.

Table 12: The odds of a participant not changing their behaviour as a result of the health brief against ethnicity.

Participants did not change behaviour as a result of the health brief.						
	B	S.E.	Wald	Df	Sig.	Exp(B)
Reference Category:			6.084	4	0.193	
Ethnic background						
White ethnicity	-2.004	.850	5.563	1	0.018	.135

Black ethnicity	-1.088	1.422	.585	1	0.444	.337
Asian ethnicity	20.115	40192.969	.000	1	1.000	544441797.867
Mixed ethnicity	20.115	40192.969	.000	1	1.000	544441797.867
Constant	1.088	.148	53.970	1	<.001	2.967

The overall effect of the ethnic background variable is not statistically significant ($P = 0.19$), meaning that ethnic background generally does not significantly predict behaviour change due to the health brief. The “white” ethnicity category is the only one to show a statistical significance ($P = 0.02$). A negative coefficient indicates that participants of White ethnicity are less likely to fall into the category of those who “did not change behaviour” compared to the reference category. White participants had 0.14 times lower odds (or an 86.5% lower likelihood) of not changing behaviour compared to the reference category, meaning they are more likely to change their behaviour due to the health brief.

There are no statistically significant results in the other ethnic groups. Still, within the Asian and Mixed Ethnicity there are substantial standard errors and non-significant p-values due to the small sample size.

There were no statistical significances to report within the categories of service /corps, educational level attained, JMES or number of Operational Tours variables.

Following the demographic data modelling, this binary logistic regression model examines the relationship between the length of the health brief during PDT and whether participants did not change their behaviour due to the health brief. The reference category for this analysis is when participants perceived the health brief as too long.

Table 13: The odds of a participant changing their behaviour due to the health brief against the length of the health brief.

Participants did not change behaviour as a result of the health brief.						
	B	S.E.	Wald	Df	Sig.	Exp(B)
Reference category:			11.735	2	0.003	
Length of the health brief during PDT was too long.						
The length of the health brief during PDT was just right.	-1.271	.376	11.400	1	<0.001	.281
The length of the health brief during PDT was too short.	-.560	.860	.424	1	0.515	.571
Constant	1.946	.338	33.132	1	<0.001	7.000

The model assesses whether the participants perceived the length of the health brief (categorised as ‘too long’, ‘just right’ or ‘too short’) and predicts the likelihood that participants did not change their behaviour after the health brief.

The overall model for the variable ‘length of the health brief’ is highly statistically significant ($P = <0.01$), suggesting that the perception of the health brief’s length is significantly associated with whether participants changed their behaviour. Particularly the category “just right”, which was highly significant ($P=0.00$) where the odds ratio of 0.28 suggests that participants who thought the health brief was “just right” were about 72% less likely to not change their behaviour, compared to those who thought the brief was too long. This indicates that perceiving the brief as appropriately timed is strongly associated with a higher likelihood of behaviour change.

The following binary logistic regression model examines the relationship between how much attention was paid to the health brief and whether participants did not change their behaviour

as a result of the health brief. As with the other models, the dependent variable is whether participants changed behaviour due to the health brief, which has a binary outcome (Yes/No). However, the predictor (independent) variable uses a Likert scale (on a scale of 1-5, how much attention did the participants pay to the brief?) which is ordinal. Ordinal variables have an “order” (like the scale of 1 to 5), but the distances between categories are not necessarily equal. The logistic regression model treated this ordinal predictor data as categorical variables and estimated the effects for each category separately (hence the comparisons for different attention levels). This was deemed appropriate as the aim was to identify if there was an association between participants' attention (such as Row 5 = “very attentive”) and whether they did not change their behaviour as a result of the health brief rather than to identify the strength of significance between the categories (such as Row 4 is higher than a Row 3, etc.).

An alternative approach could have been to run an ordinal logistic regression, which would have allowed modelling of the ordered relationships, but as explained above, there wasn't a reason to do this.

Participants did not change behaviour as a result of the health brief							
		B	S.E.	Wald	Df	Sig.	Exp(B)
	Reference			17.373	4	0.002	
	Very attentive towards the health brief.						
	No attention paid to the health brief.	.470	.749	.394	1	0.530	1.600
	Very little attention paid to the health brief.	-.525	.677	.603	1	0.438	0.591
	Neither too much nor too little attention paid to the health brief.	-1.188	.692	2.948	1	0.086	0.305

A little attention paid to the health brief.	-1.466	.737	3.955	1	0.047	0.231
Constant	1.609	.632	6.476	1	0.011	5.000

The overall model is highly significant ($P = <0.01$), indicating that the level of attention paid to the health brief is related to whether participants changed behaviour due to the health brief.

The reference category 'a little attention paid to the health brief' is significant ($P = 0.05$) compared to the reference category, indicating that participants who rated their attention level as "a little attention paid to the health brief" were 0.23 times less likely to not change behaviour, compared to those who were "very attentive".

The following binary logistic regression model examines the relationship between the rating the participants gave the health brief and whether participants did not change their behaviour as a result of the health brief. The reference category for this analysis is when participants rated the health brief as "excellent". As mentioned above, this model also uses ordinal data (Likert scale), which has been run as a categorical variable.

Participants did not change their behaviour as a result of the health brief.							
	B	S.E.	Wald	Df	Sig.	Exp(B)	
Reference:			32.890	4	<0.001		
Excellent health brief							
V poor health brief	.247	.912	.073	1	0.787	1.280	
Poor health brief	.247	.823	.090	1	0.764	1.280	
Neither good nor bad	-1.581	.810	3.810	1	0.051	0.206	
Good health brief	-1.427	.885	2.600	1	0.107	0.240	
Constant	1.609	.775	4.317	1	0.038	05.000	

This model for the overall variable (rating of the health brief) is highly significant ($P = <0.01$), which indicates that participants' ratings of the health brief are significantly related to whether they changed their behaviour as a result of the brief. In the category "Neither good nor bad" rating, there was an effect which was close to being statistically significant ($P=0.051$), which implies that participants who rated the brief as "neither good nor bad" were less likely to not change behaviour (i.e., more likely to change behaviour) compared to those who rated the brief as "excellent", with an odds ratio of 0.21.

The following binary logistic regression model examines the relationship between participants who took a risk with their health and whether participants did not change their behaviour as a result of the health brief. The reference category for this analysis is when participants took a risk to their health.

Table 14: The odds of a participant changing their behaviour as a result of the health brief if they took a risk to their health.

Did not change behaviour as a result of the health brief						
	B	S.E.	Wald	Df	Sig.	Exp(B)
Reference: (Yes) The participant took a "risk" to their health even though they knew the possible result.			5.113	2	0.078	
Did not take a "risk" to their health.	0.708	0.315	5.043	1	0.025	2.029
Not sure if they took a "risk" to their health	0.322	0.514	0.392	1	0.531	1.380
Constant	0.565	0.250	5.095	1	0.024	1.760

Overall, risk-taking is not a significant predictor of behaviour change, with a borderline P score of 0.08. However, a significance was reported ($P=0.02$) in the 'no' participants did not take any risks category. The odds of participants not adopting a change were twice (2.03) as likely for those who did not take a risk compared to the reference category who did take a risk with their health.

4.4.6a Section 6. Test of Association 2 – Attitude (*paying attention to the Health Brief*):

- a. The Independent-Samples Kruskal-Wallis statistical test was used to report an association between the attention a participant paid to the health brief and the other independent variables (participant demographics and other questions). Based on the significance level (P-value), the decision column indicates whether the null hypothesis was retained or rejected. The null hypothesis is retained if the p-value was greater than 0.050, suggesting no significant difference in response distributions across categories. The null hypothesis is rejected if the p-value is less than 0.050, indicating a significant difference in response distributions.

Table 15: Kruskal-Wallis test for associations between “Q11. Overall, on a scale of 1-5, how much attention did you pay to the brief?” and all other independent variables (Q1-23).

Q11. Overall, on a scale of 1-5, how much attention did you pay to the brief?

Independent Variable (Q1-23)	P Value	Decision
Q1. Age Categories	0.277	Retain the null hypothesis
Q2. Ethnic Background	0.363	Retain the null hypothesis
Q3. Service/Corps	0.101	Retain the null hypothesis
Q4. Educational Qualification	0.861	Retain the null hypothesis
Q5. Joint Medical Employment Standard	0.223	Retain the null hypothesis
Q6. Operational Tours Completed	0.032	Reject the null hypothesis
Q7. Remember Receiving a Health Brief	0.003	Reject the null hypothesis
Q8. Perceived Need for Health Brief	0.008	Reject the null hypothesis
Q9. When Health Brief Should Be Given	0.001,	Reject the null hypothesis

Q10. Days in Theatre When Receiving Health Brief	0.001	Reject the null hypothesis
Q12. Length of Health Brief	0.001	Reject the null hypothesis
Q13. Who Should Deliver Health Brief	0.202	Retain the null hypothesis
Q14. Group Delivery of Health Brief	0.253	Retain the null hypothesis
Q15. Appropriate Venue for Health Briefs	0.359	Retain the null hypothesis
Q16. Knowledge of Protection Against Illness/Injury	0.077	Retain the null hypothesis
Q17. Rating of Health Brief	0.001	Reject the null hypothesis
Q18. Adoption of Practice/Change in Routine	0.001	Reject the null hypothesis
Q19. Risk to Health Despite Knowing Risks	0.042	Reject the null hypothesis
Q20. Nature of Risk	0.899	Retain the null hypothesis
Q21. Illness/Injury While on Tour	0.258	Retain the null hypothesis
Q22. Category of Illness/Injury	0.893	Retain the null hypothesis
Q23. Reporting Illness/Injury to Medical Facility	0.109	Retain the null hypothesis

Summary of Statistically Significant Associations with paying attention.

Operational tours completed (Q6) had a significant effect ($P = 0.032$). Those with more operational experience may have paid less attention.

Remembering the health brief (Q7, $P = 0.003$), perceived need for the health brief (Q8, $P = 0.008$), and when it should be given (Q9, $P = 0.001$) were all significantly associated with attention. This implies that those who recognise the necessity of the health brief and remember attending it were more likely to engage actively.

Timing of the health brief (Q10, $P = 0.001$) and length of the health brief (Q12, $P = 0.001$) were both significantly associated with attention levels. This suggests that the delivery timing and duration play a role in maintaining engagement.

Participants who rated the health brief higher (Q17, $P = 0.001$) and those who adopted new practices (Q18, $P = 0.001$) were more likely to have paid attention. This reinforces the idea that a well-received and practically useful brief leads to better engagement.

Those who took health risks despite knowing the risks (Q19, $P = 0.042$) had a significant association with attention levels.

Summary of Variables with No Associations with paying attention.

Who delivered the brief (Q13), group delivery format (Q14), venue choice (Q15), and knowledge on protection against illness/injury (Q16) were not significantly linked to attention. This implies that the presentational setting and format did not play a major role in engagement levels.

Illness or injury while on tour (Q21, $P = 0.258$), nature of illness (Q22, $P = 0.893$), and reporting behaviour (Q23, $P = 0.109$) were not significantly associated with attention levels. This suggests that experiencing health issues on deployment did not necessarily correlate with how much attention personnel paid to the health brief.

The overall interpretation is that 'Attention to the health brief' is strongly linked to engagement, perceived relevance, and practical application rather than demographic factors or illness experience.

4.4.6b. A regression analysis model - Attitude was used to predict the dependant variable (paying attention) and other independent variables.

Table 16 shows the dependant variable "paying attention" binary logistic regression modelling.

Variable	Category	Df	Sig	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Q7.	Yes	1	.038*	2.508	1.051	5.984

Remember						
receiving a health						
brief.						
Q8.	Yes	1	.325	1.503	.668	3.384
A need for the						
health brief.						
Q16.	Yes	1	.537	1.642	.339	7.946
Know how to						
protect myself						
against illness						
and injury on the						
operational tour						
after the health						
brief.						
Constant		1	<.001*	2.163		

Summary: This modelling shows that if the participant remembered the health brief, then they were more likely to have paid attention to the health brief.

4.4.7a Section 7. Test of Association 3 – Risk Taking:

- a. Chi Squared (or Fishers Exact if the cell numbers were small) statistical test was used to report an association between participants who believed they took a risk with their health and the other independent variables (participant demographics and other questions).

There were no relationships between the participant demographics and whether they took a “risk to their health even though they knew the possible results”.

Against the other variables (questions 7 to 23), the following had relationships that were statistically significant:

Table 17: χ^2 test for associations between “Did you take a risk to your health even though you knew the possible results?” and the independent variables (Q7-23).

Q19. Did you take a “risk” to your health even though you knew the possible result?				
Independent variable	Yes	No	Not Sure	P Value
	%= (n=)	%= (n=)	%= (n=)	
7. Do you remember receiving a health brief?				0.001
Yes	53 (67.9%)	7 (9.0%)	16 (20.5%)	
No	144 (83.2%)	11 (6.4%)	18 (10.4%)	
Can’t remember	19 (44.2%)	7 (16.3%)	17 (39.5%)	
Don’t know	0 (0.0%)	0 (0.0%)	0 (0.0%)	
8. Do you think there is a need for the health brief?				0.001
Yes	64 (82.1%)	9 (11.5%)	5 (6.4%)	
No	141 (81.5%)	25 (14.5%)	7 (4.0%)	
Don’t Know	22 (51.2%)	9 (20.9%)	12 (27.9%)	
9. When should it be given?				0.001
Before every operational tour	50 (64.1%)	11 (14.1%)	14 (17.9%)	
During every operational tour	123 (71.1%)	3 (1.7%)	31 (17.9%)	

Just on the high tempo tours	24 (55.8%)	1 (2.3%)	11 (25.6%)
Before a person's first tour only	2 (2.6%)	9 (5.2%)	3 (7.0%)
I do not think the brief is needed at all	1 (1.3%)	7 (4.0%)	4 (9.3%)

10. How many days had you been in Theatre when you received another health brief? 0.420

I did not receive a second health brief	38 (48.7%)	70 (40.5%)	23 (53.5%)
First Day - 1 month	27 (34.6%)	60 (34.7%)	8 (18.6%)
2 - 3 months	6 (7.7%)	16 (9.2%)	7 (16.3%)
4 -5 months	1 (1.3%)	8 (4.6%)	0 (0.0%)
After the 5-month point	6 (7.7%)	19 (11.0%)	5 (11.6%)

11. Overall, on a scale of 1-5 how much attention did you pay to the brief? 0.025

No Attention – 1	6 (7.7%)	11 (6.4%)	6 (14.3%)
Not Much Attention – 2	19 (24.4%)	42 (24.3%)	11 (26.2%)
Neither Attentive nor Not Attentive – 3	21 (26.9%)	67 (38.7%)	18 (42.9%)
A Little Attention – 4	22 (28.2%)	32 (18.5%)	6 (14.3%)
Very Attentive – 5	10 (12.8%)	21 (12.1%)	1 (2.4%)

12. What do you think about the length of the health brief during your PDT? 0.001

Too Long	21 (26.9%)	58 (33.5%)	16 (37.2%)
About Right	54 (69.2%)	109(63.0%)	23 (53.5%)
Too Short	3 (3.8%)	6 (3.5%)	3 (7.0%)

13. Who do you think should deliver the health brief? 0.001

Chain of Command	7 (9.0%)	20 (11.6%)	7 (16.3%)
Your Line Manager	0 (0.0%)	2 (1.2%)	0 (0.0%)

A Peer or Friend	2 (2.6%)	6 (3.5%)	0 (0.0%)
Health Professional Not Attached to Your Unit	22 (28.2%)	48 (27.7%)	14 (32.6%)
Your Own Regimental Medical Officer (RMO) or Unit Medic	45 (57.7%)	89 (51.4%)	21 (48.8%)
A Local Person of The Country You Deploy To	1 (1.3%)	5 (2.9%)	0 (0.0%)
Other	1 (1.3%)	3 (1.7%)	1 (2.3%)

14. Do you think the health brief should be delivered in groups 0.001

according:

Rank	11 (14.1%)	17 (9.8%)	7 (16.3%)
Operational Experience	5 (6.4%)	18 (10.4%)	2 (4.7%)
Age	2 (2.6%)	4 (2.3%)	3 (7.0%)
Those From a Medical Background	3 (3.8%)	8 (4.6%)	1 (2.3%)
Size (individual, smaller or larger groups)	11 (14.1%)	14 (8.1%)	2 (4.7%)
I Have No Preference	46 (59.0%)	112(64.7%)	28 (65.1%)

15. Which do you think is an appropriate venue for the health 0.001

briefs?

Lecture Theatre	43 (55.1%)	101(58.4%)	26 (60.5%)
Classroom Based	16 (20.5%)	30 (17.3%)	7 (16.3%)
In A Medical Setting (such as the Medical Centre)	5 (6.4%)	12 (6.9%)	3 (7.0%)
Social Setting	11 (14.1%)	20 (11.6%)	4 (9.3%)
Computer Based E-learning	0 (0.0%)	2 (1.2%)	1 (2.3%)
Other	3 (3.8%)	8 (4.6%)	2 (4.7%)

16. Did you know how to protect yourself against illness and injury on the operational tour after the health brief?				0.001
Yes	72 (92.3%)	167(96.5%)	35 (81.4%)	
No	4 (5.1%)	3 (1.7%)	1 (2.3%)	
Not Sure	2 (2.6%)	3 (1.7%)	7 (16.3%)	
17. Overall, what number would you use (1-5) to rate the health brief				0.001
V Poor – 1	7 (9.0%)	4 (2.3%)	3 (7.0%)	
Poor – 2	8 (10.3%)	27 (15.6%)	6 (14.0%)	
Neither Good Nor Bad – 3	31 (39.7%)	80 (46.2%)	20 (46.5%)	
Good – 4	26 (33.3%)	47 (27.2%)	10 (23.3%)	
Excellent – 5	6 (7.7%)	15 (8.7%)	3 (7.0%)	
18. Did you adopt a practice/ change your usual routine as a result of the health brief?				0.001
19. Did you take a “risk” to your health even though you knew the possible result?				Independent Variable
20. If yes, what was this risk?				0.038
Not Carrying Out Advised Sanitation Procedures (e.g. washing hands)	31 (39.7%)	5 (21.7%)	36(35.6%)	
Not Taking Medication As Advised	1 (1.3%)	1 (4.3%)	2 (2.0%)	
Not Using Personal Protective Equipment (PPE)	5 (6.4%)	2 (8.7%)	7 (6.9%)	
Eating Local Food	15 (19.2%)	2 (8.7%)	17 (16.8%)	
Drinking Local Water	3 (3.8%)	1 (4.3%)	4 (4.0%)	
Swimming In Local Water	0(0.0%)	1 (4.3%)	1 (1.0%)	
Being Sexually Active With Sex Workers	2 (2.6%)	0 (0.0%)	2 (2.0%)	

Playing Contact Sport	10 (12.8%)	1 (4.3%)	11 (10.9%)
Other	11 (14.1%)	10 (43.5%)	21 (20.8%)
21. Did you suffer from an illness or injury whilst on tour?			0.708
Yes	23 (29.5%)	36(20.8%)	8 (18.6%)
No	55 (70.5%)	136(78.6%)	35 (81.4%)
22. If so, which category would you put your illness or injury			0.454
Ligament, Tendon or Muscle Damage	1 (52.2%)	0 (40.5%)	0 (50.0%)
Broken Bone(s)	1 (4.3%)	0 (0.0%)	0 (0.0%)
Stomach Cramps	14. (3%)	6 (16.2%)	0 (0.0%)
Diarrhoea & Vomiting	5 (21.7%)	5 (13.5%)	3 (37.5%)
Toothache	1 (4.3%)	3 (8.1%)	0 (0.0%)
Skin problem	0 (0.0%)	1 (2.7%)	1 (12.5%)
Sore throat	1 (4.3%)	2 (5.4%)	0 (0.0%)
Cough	1 (4.3%)	0 (0.0%)	0 (0.0%)
I Prefer Not to Say	1 (4.3%)	5 (13.5%)	0 (0.0%)
23. If so, did you report this illness or injury to the Medical Facility?			0.551
Yes	15 (19.2%)	30 (17.3%)	6 (14.0%)
No	8 (10.3%)	5 (2.9%)	2 (4.7%)
Can't Remember	0 (0.0%)	1 (0.6%)	0 (0.0%)

Summary of Statistically Significant Associations with risk taking:

The findings from the data reveal significant statistical associations between participants willingness to take risks to their health despite knowing the possible consequences and other variables.

Participants who remembered receiving a health brief were less likely to take risks to their health ($p = 0.001$).

There was a significant association between perceived need for the health brief and taking risks to health ($p = 0.001$). Participants who believed there was a need for the brief were less likely to take risks compared to those who did not see the need.

Timing of the health brief also showed a significant association with taking risks to health ($p = 0.001$). Those who believed the brief should be given before every operational tour were more likely to take fewer risks compared to other groups.

Attention paid to the health brief was significantly associated with taking risks to health ($p = 0.025$). Respondents who paid more attention to the brief were less likely to take risks compared to those who paid less attention.

There was a significant association between the perceived length of the health brief and taking risks to health ($p = 0.001$). Participants who found the brief too long were more likely to take risks compared to those who found it appropriate.

The deliverer of the health brief was significantly associated with taking risks to health ($p = 0.001$). Participants who believed their own Regimental Medical Officer or Unit Medic should deliver the brief were less likely to take risks compared to other groups.

Participants overall rating of the health brief was significantly associated with taking risks to health ($p = 0.001$). Those who rated the brief positively were less likely to take risks compared to those who rated it negatively.

The effect of the health brief on behaviour was significantly associated with taking risks to health ($p = 0.001$). Participants who adopted a practice or changed their routine as a result of the brief were less likely to take risks compared to those who did not.

There were significant associations between the type of risk taken and the perception of the health brief ($p = 0.038$). Not carrying out advised sanitation procedures was the most common risk taken.

Summary of Variables with No Associations with risk taking:

None of the demographic characteristics were statistically significantly associated with the participants taking risks to their health.

The amount of time in theatre, reported illness, category of illness and whether a participant reported the illness to the medical centre did not result in any statistical associations.

4.4.7b. A regression analysis modelling – Risk Taking for the dependant variable (risk taking) and other independent variables (participant demographics and other questions).

Table 18 shows the dependant variable did you take a risk to your health? binary logistic regression modelling against the cohort demographics.

Variable	Category	df	Sig	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Age		4	.966			
	18-25	1	.464	1.319	.629	2.767
	26-30	1	.664	1.336	.361	4.950
	31- 35	1	.822	1.177	.284	4.872
	36 – 40	1	.999	Low No's	.000	.
Ethnic		4	.998			
Background						
	White	1	.718	.701	.102	4.827
	Black	1	.999	Low No's	.000	.
	Asian	1	1.000	Low No's	.000	.
	Mixed	1	1.000	Low No's	.000	.
	ethnicity					
Service/Corps		9	.790			
	AAC	1	.285	.284	.028	2.855
	AGC	1	.708	1.403	.239	8.217
	AMS	1	.934	1.078	.182	6.387
	AWS RLC	1	.999	Low No's	.000	.
	CAMUS	1	.556	2.332	.139	39.070
	Infantry REME	1	1.000	1.769	.000	.

	RE	1	1.000	.000	.000	.
	REME	1	1.000	Low no's	.000	.
	RSigs	1	.260	5.309	.291	97.020
Highest educational qualification		7	.854			
	No	1	.598	.628	.112	3.533
	Qualifications					
	Level 1 & 2	1	.999	Low no's	.000	.
	Level 3	1	.804	.808	.150	4.364
	(Certificate)					
	Level 4	1	.414	.484	.085	2.763
	(GCSE's)					
	Level 5 (A	1	.717	.711	.113	4.484
	Levels)					
	Level 6	1	.728	.654	.060	7.165
	(Dip/Degree)					
	Level 7	1	.182	.078	.002	3.313
	(Masters)					
Joint Medical Employment Standard		3	.993			
	MFD	1	.773	1.318	.201	8.621
	MLD	1	1.000	Low no's	.000	.
	MND	1	.952	1.073	.105	10.948
		2	.216			

**No of
Operational
Tours**

1-2	1	.441	1.430	.576	3.551
3-4	1	.239	.475	.138	1.639
Constant		1	.465	2.472	

Summary: A participant's demographics is not an indicator as to whether they would take not take a risk to their health following the health brief.

Attitude Data

This analysis explored whether the participants risk taking was due to their attitude towards the health brief. The modelling showed whether they remembered the brief, felt that there was a need for it and knew how to protect themselves would be a factor towards them not taking a risk with their health.

Table 19. shows the dependant variable "taking a risk" binary logistic regression modelling against the participant's "attitude".

Variable	Category	Df	Sig	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Q7.		3	.481			
Remember receiving a health brief.	Yes	1	.302	.591	.218	1.604
	No	1	.180	.551	.231	1.317
	Can't remember	1	.999	.000	.000	

Q8.		2	.393			
A need for the health brief.						
	Yes	1	.200	1.824	.727	4.573
	No	1	.517	1.523	.427	5.433
Q16.		2	.339			
Know how to protect myself against illness and injury on the operational tour after the health brief.						
	Yes	1	.147	.290	.054	1.544
	No	1	.853	1.235	.132	11.534
Constant		1	<.001	2.877		

Summary: Attitude is not an indicator as to whether they would take a risk to their health following the health brief.

Delivery of the health brief.

This analysis explored whether the participants risk taking was due to the delivery of the health brief. The modelling showed whether the time the health brief was given, days in theatre before the second brief, length, who delivered it, group composition and venue would be a factor towards them not changing a behaviour as a result of the health brief.

Table 20 shows the dependant variable "risk taking" binary logistic regression modelling against the delivery of health brief.

Variable	Category	df	Sig	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Q9.		4	.005*			
The time the health brief should be given.						
	Before every operational tour	1	<.001*	.064	.014	.286
	During every operational tour	1	.756	.879	.391	1.978
	Just on the high tempo tours	1	.410	2.205	.336	14.460
	Before a person's first tour only	1	.359	3.011	.285	31.771
Q10.		4	.346			
Days in Theatre before another brief was received.						
	I did not receive a	1	.521	1.257	.625	2.528

second						
health brief						
First Day - 1	1	.235	2.026	.632	6.498	
month						
2 - 3 months	1	.999	1749	.000	.	
4 -5 months	1	.055*	3.439	.976	12.115	
Q12. Length	2	.427				
of the health						
brief during						
PDT.						
Too Long	1	.200	.613	.291	1.295	
About right	1	.877	.860	.127	5.820	
Q13. Deliver	6	.827				
the health						
brief.						
Chain of	1	.999	4065	.000	.	
Command						
Your Line	1	.276	.298	.034	2.633	
Manager						
A Peer or	1	.991	1.006	.328	3.088	
Friend						
Health	1	.849	.901	.306	2.650	
Professional						
Not Attached						
to Your Unit						
Your Own	1	.331	3.714	.264	52.259	
Regimental						

	Medical					
	Officer					
	(RMO) or					
	Unit Medic					
	A Local	1	.576	.454	.028	7.258
	Person Of					
	The Country					
	You Deploy					
	To					
Q14. Groups		5	.632			
composition						
for the						
delivery of the						
health brief.						
	Rank	1	.682	1.355	.316	5.813
	Operational	1	.547	.520	.062	4.361
	experience					
	Age	1	.703	1.531	.172	13.618
	Those from	1	.345	.531	.143	1.974
	a medical					
	background					
	I have no					
	preference					

	Size	1	.710	1.208	.446	3.268
	(individual, smaller or larger groups)					
Q15.		5	.998			
Appropriate venue for the health briefs.						
	Lecture theatre	1	.739	1.161	.483	2.792
	Classroom based	1	.680	1.292	.383	4.360
	In a medical setting (such as the Medical Centre)	1	.922	.951	.348	2.598
	Social setting	1	.999	11k	.000	.
	Computer based	1	.998	.998	.220	4.520

Constant	1	.126	2.933
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* Statistically significant – <0.05

Summary:

Significant differences were found amongst the following categories: giving the brief before every operational tour had a significantly lower odds ratio compared to other options.

Delivering the brief through the Chain of Command and by “Your Own Regimental Medical Officer (RMO) or Unit Medic” had higher odds ratios compared to other options.

There were no significant differences in the categories dealing with the time in Theatre the second brief, group composition or venue.

4.4.8a Section 8. Test of Association 4: Illness or Injury:

- a. Chi Squared (or Fishers Exact if the cell numbers were small) statistical test was used to report an association between participants who had an illness or injury whilst on tour and the other independent variables (participant demographics and other questions).

There were no relationships between the participant demographics and whether they were ill or had an injury on tour.

Against the other variables (questions 7 to 23), the following had correlations that were significant.

Table 21: X^2 test for associations between the “Did you adopt suffer an illness or injury on tour?” and independent variables (Q7-23).

Q21. Did you suffer from an illness or injury whilst on tour?				
Independent variable	Yes	No	Not Sure	P Value
	%= (n=)	%= (n=)	%= (n=)	

7. Do you remember receiving a health brief?				0.001
Yes	60 (89.6%)	140(75.7%)	15 (36.6%)	
No	3 (4.5%)	18 (9.7%)	4 (9.8%)	
Can't remember	3 (4.5%)	26 (14.1%)	22 (53.7%)	
Don't know	1 (1.5%)	1 (0.5%)	0 (0.0%)	
8. Do you think there is a need for the health brief?				0.015
Yes	58 (86.6%)	143(77.3%)	25 (61.0%)	
No	71 (0.4%)	28 (15.1%)	81 (9.5%)	
Don't Know	2 (3.0%)	14 (7.6%)	81 (9.5%)	
9. When should it be given?				0.228
Before every operational tour	51 (76.1%)	117(63.2%)	28 (68.3%)	
During every operational tour	5 (7.5%)	10 (5.4%)	0 (0.0%)	
Just on the high tempo tours	81 (1.9%)	40 (21.6%)	81 (9.5%)	
Before a person's first tour only	3 (4.5%)	9 (4.9%)	2 (4.9%)	
I do not think the brief is needed at all	0 (0.0%)	9 (4.9%)	3 (7.3%)	
10. How many days had you been in Theatre when you received another health brief?				0.628
I did not receive a second health brief	24 (35.8%)	85 (45.9%)	22 (53.7%)	
First Day - 1 month	29 (43.3%)	56 (30.3%)	10 (24.4%)	
2 - 3 months	6 (9.0%)	19 (10.3%)	3 (7.3%)	
4 -5 months	2 (3.0%)	6 (3.2%)	1 (2.4%)	
After the 5-month point	6 (9.0%)	19 (10.3%)	5 (12.2%)	
11. Overall, on a scale of 1-5 how much attention did you pay to the brief?				0.007
No Attention – 1	3 (4.5%)	15 (8.1%)	51 (2.5%)	

Not Much Attention – 2	71 (0.4%)	56 (30.3%)	92 (2.5%)
Neither Attentive nor Not Attentive – 3	23 (34.3%)	68 (36.8%)	14 (35.0%)
A Little Attention – 4	21 (31.3%)	31 (16.8%)	8 (20.0%)
Very Attentive – 5	13 (19.4%)	15 (8.1%)	4 (10.0%)

12. What do you think about the length of the health brief during your PDT? 0.003

Too Long	10 (14.9%)	70 (37.8%)	15 (36.6%)
About Right	55 (82.1%)	107(57.8%)	23 (56.1%)
Too Short	2 (3.0%)	8 (4.3%)	2 (4.9%)

13. Who do you think should deliver the health brief? 0.247

Chain of Command	14 (20.9%)	14 (7.6%)	51 (2.2%)
Your Line Manager	1 (1.5%)	1 (0.5%)	0 (0.0%)
A Peer or Friend	2 (3.0%)	6 (3.2%)	0 (0.0%)
Health Professional Not Attached to Your Unit	21 (31.3%)	51 (27.6%)	12 (29.3%)
Your Own Regimental Medical Officer (RMO) or Unit Medic	26 (38.8%)	106(57.3%)	23 (56.1%)
A Local Person of The Country You Deploy To	2 (3.0%)	4 (2.2%)	0 (0.0%)
Other	1 (1.5%)	3 (1.6%)	1 (2.4%)

14. Do you think the health brief should be delivered in groups according: 0.732

Rank	10 (14.9%)	20 (10.8%)	4 (9.8%)
Operational Experience	5 (7.5%)	1910.3%	12.4%
Age	23.0%	42.2%	37.3%
Those From a Medical Background	23.0%	84.3%	24.9%

Size (individual, smaller or larger groups)	57.5%	189.7%	49.8%
I Have No Preference	4364.2%	11662.7%	2765.9%
15. Which do you think is an appropriate venue for the health briefs?			0.367
Lecture Theatre	45 (67.2%)	97 (52.4%)	27 (65.9%)
Classroom Based	71 (0.4%)	36 (19.5%)	10 (24.4%)
In A Medical Setting (such as the Medical Centre)	4 (6.0%)	15 (8.1%)	1 (2.4%)
Social Setting	71 (0.4%)	26 (14.1%)	2 (4.9%)
Computer Based E-learning	1 (1.5%)	2 (1.1%)	0 (0.0%)
Other	3 (4.5%)	9 (4.9%)	1 (2.4%)
16. Did you know how to protect yourself against illness and injury on the operational tour after the health brief?			0.001
Yes	65 (97.0%)	175(94.6%)	33 (80.5%)
No	2 (3.0%)	5 (2.7%)	1 (2.4%)
Not Sure	0 (0.0%)	5 (2.7%)	7 (17.1%)
17. Overall, what number would you use (1-5) to rate the health brief			0.001
V Poor – 1	2 (3.0%)	10 (5.4%)	2 (4.9%)
Poor – 2	5 (7.5%)	32 (17.3%)	4 (9.8%)
Neither Good Nor Bad – 3	15 (22.4%)	96 (51.9%)	19 (46.3%)
Good – 4	35 (52.2%)	35 (18.9%)	13 (31.7%)
Excellent – 5	10 (14.9%)	12 (6.5%)	2 (4.9%)
18. Did you adopt a practice/ change your usual routine as a result of the health brief?			Previously reported
19. Did you take a “risk” to your health even though you knew the possible result?			Previously reported

20. If yes, what was this risk?				0.562
Not Carrying Out Advised Sanitation Procedures (e.g. washing hands)	13 (48.1%)	17 (32.7%)	62 (7.3%)	
Not Taking Medication As Advised	0 (0.0%)	0 (0.0%)	2 (9.1%)	
Not Using Personal Protective Equipment (PPE)	31 (1.1%)	3 (5.8%)	1 (4.5%)	
Eating Local Food	31 (1.1%)	10 (19.2%)	4 (18.2%)	
Drinking Local Water	0 (0.0%)	3 (5.8%)	1 (4.5%)	
Swimming In Local Water	0 (0.0%)	1 (1.9%)	0 (0.0%)	
Being Sexually Active with Sex Workers	1 (3.7%)	1 (1.9%)	0 (0.0%)	
Playing Contact Sport	2 (7.4%)	61 (1.5%)	3 (13.6%)	
Other	5 (18.5%)	11 (21.2%)	52 (2.7%)	
21. Did you suffer from an illness or injury whilst on tour?				Independent
				Variable
22. If so, which category would you put your illness or injury				0.015
Ligament, Tendon or Muscle Damage	8 (50.0%)	22 (47.8%)	11 (6.7%)	
Broken Bone(s)	0 (0.0%)	0 (0.0%)	11 (6.7%)	
Stomach Cramps	0 (0.0%)	7 (15.2%)	0 (0.0%)	
Diarrhoea & Vomiting	21 (2.5%)	8 (17.4%)	3 (50.0%)	
Toothache	0 (0.0%)	4 (8.7%)	0 (0.0%)	
Skin problem	1 (6.3%)	1 (2.2%)	0 (0.0%)	
Sore throat	21 (2.5%)	0 (0.0%)	11 (6.7%)	
Cough	0 (0.0%)	1 (2.2%)	0 (0.0%)	
I Prefer Not to Say	31 (8.8%)	3 (6.5%)	0 (0.0%)	
23. If so, did you report this illness or injury to the Medical Facility?				0.715
Yes	14 (20.9%)	33 (17.8%)	4 (9.8%)	

No	2 (3.0%)	11 (5.9%)	2 (4.9%)
Can't Remember	0 (0.0%)	1 (0.5%)	0 (0.0%)

Summary of Statistically Significant Associations with illness/injury:

A significant association exists between receiving a health brief and suffering from illness or injury during the tour (p-value = 0.001). The majority of those who suffered from illness or injury received a health brief compared to those who did not.

Those who suffered from illness or injury were more likely to perceive a need for the health brief (p-value = 0.015). The majority of those who suffered from illness or injury believed there was a need for the health brief compared to those who did not.

There's a significant association between paying attention to the health brief and suffering from illness or injury (p-value = 0.007). Those who suffered from illness or injury tended to pay more attention to the health brief.

There's a significant association between opinions on the length of the health brief and suffering from illness or injury (p-value = 0.003). Participants who suffered from illness or injury were more likely to perceive the health brief as being about right in length.

There's a significant association between knowing how to protect oneself after the health brief and suffering from illness or injury (p-value = 0.001). The majority of those who suffered from illness or injury reported that they knew how to protect themselves after the health brief.

There's a significant association between the rating of the health brief and suffering from illness or injury (p-value = 0.001). Those who suffered from illness or injury tended to rate the health brief higher.

There's a significant association between the type of illness or injury and suffering from it (p-value = 0.015). Different types of illnesses or injuries were reported by different groups.

Summary of Variables with No Associations with risk taking:

None of the demographic characteristics were statistically significantly associated with the participants taking risks to their health.

When the second brief was given, by who, in which venue and groups, category of illness and whether a participant reported the illness to the medical centre did not result in and statistical associations.

4.4.8 b. A regression analysis modelling – illness. for the dependant variable (illness) and other independent variables (participant demographics and other questions).

Table 21 shows the dependant variable “Did you have an illness or injury on tour?” binary logistic regression modelling against the cohort demographics.

Variable	Category	df	Sig	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Age		4	.904			
	18-25	1	.417	1.407	.617	3.206
	26-30	1	.570	1.481	.383	5.730
	31- 35	1	.694	1.331	.320	5.541
	36 – 40	1	.449	2.857	.189	43.250
Ethnic		4	.948			
Background						
	White	1	.394	.428	.061	3.012
	Black	1	.999	Low no's	.000	.
	Asian	1	1.000	.063	.000	.
	Mixed ethnicity	1	1.000	.866	.000	.
Service/Corps		9	.333			
	AAC	1	.699	.614	.052	7.286
	AGC	1	.691	1.484	.212	10.371
	AMS	1	.512	.521	.074	3.667
	AWS RLC	1	.411	3.360	.187	60.261
	CAMUS	1	.436	.346	.024	5.016
	Infantry REME	1	1.000	Low no's	.000	.

	RE	1	1.000	.000	.000	.
	REME	1	1.000	Low no's	.000	.
	RSigs	1	.584	2.086	.150	28.971
Highest educational qualification		7	.249			
	No Qualifications	1	.600	1.632	.262	10.182
	Level 1 & 2	1	.994	1.012	.059	17.237
	Level 3 (Certificate)	1	.981	.979	.174	5.502
	Level 4 (GCSE's)	1	.509	1.875	.291	12.104
	Level 5 (A Levels)	1	.348	.414	.066	2.610
	Level 6 (Dip/Degree)	1	.719	.644	.059	7.076
	Level 7 (Masters)	1	.342	.174	.005	6.400
Joint Medical Employment Standard		3	1.000			
	MFD	1	.904	1.127	.162	7.853
	MLD	1	1.000	Low no's	0	.
	MND	1	.999	Low no's	0	.
		2	.134			

No of

Operational

Tours

1-2	1	.522	.732	.281	1.904
3-4	1	.047*	.272	.076	.981
Constant	1	.404	3.007		

Summary: This modelling shows that if the participant had completed 3-4 operational tours then they are more likely to have not been ill or had an injury.

Attitude Data

This analysis explored whether the participants were ill/injured was associated to their attitude towards the health brief. The modelling showed whether they remembered they brief, felt that there was a need for it and knew how to protect themselves would be a factor towards them not being ill/injured.

Table 22 shows the dependant variable having an illness or injury binary logistic regression modelling against the participant's "attitude".

Variable	Category	Df	Sig	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Q7.		3	.386			
Remember receiving a health brief.	Yes	1	.663	.792	.278	2.258

	No	1	.109	2.821	.795	10.009
	Can't	1	.817	.695	.032	15.172
	remember					
Q8.		2	.579			
A need for the health brief.						
	Yes	1	.296	1.686	.633	4.492
	No	1	.912	1.080	.280	4.166
Q16.		2	.238			
Know how to protect myself against illness and injury on the operational tour after the health brief.						
	Yes	1	.090	.244	.048	1.248
	No	1	.999	497171010.346	.000	.
Constant		1	<.001	2.802		

Summary: Attitude is not an indicator as to whether they would take a risk to their health following the health brief.

Delivery of the health brief.

Table 23 shows the dependant variable "illness/ injury" binary logistic regression modelling against the delivery of health brief.

Variable	Category	df	Sig	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Q9. The time the health brief should be given.		4	.111			
	Before every operational tour	1	.049*	.302	.092	.994
	During every operational tour	1	.946	.971	.417	2.260
	Just on the high tempo tours	1	.056*	18.559	.924	372.870
	Before a person's first tour only	1	.886	.862	.113	6.598
Q10. Days in Theatre before another brief was received.		4	.453			
	I did not receive a	1	.258	.651	.310	1.369

Q12. Length of the health brief during PDT.	second health					
	brief					
	First Day - 1	1	.572	1.435	.410	5.025
	month					
	2 - 3 months	1	.948	1.060	.183	6.145
	4 -5 months	1	.319	1.926	.530	6.992
		2	.615			
	Too Long	1	.462	1.332	.621	2.857
	About right	1	.707	.729	.140	3.799
		6	.294			
Q13. Deliver the health brief.	Chain of	1	.999	27k	.000	.
	Command					
	Your Line	1	.017*	.051	.004	.590
	Manager					
	A Peer or	1	.232	.464	.132	1.636
	Friend					
	Health	1	.560	.692	.201	2.384
	Professional					
	Not Attached					
	to Your Unit					
	Your Own	1	.233	.267	.030	2.342
	Regimental					
	Medical					

Q14. Groups composition for the delivery of the health brief.	Officer (RMO) or Unit Medic A Local Person Of The Country You Deploy To	1	.999	26	.000	.
		5	.464			
	Rank	1	.524	.566	.098	3.261
	Operational experience	1	.459	.368	.026	5.171
	Age	1	.542	.511	.059	4.421
	Those from a medical background I have no preference	1	.136	.319	.071	1.432
	Size (individual,	1	.046*	.297	.090	.978

	smaller or larger groups)					
Q15.		5	.600			
Appropriate venue for the health briefs.						
	Lecture theatre	1	.962	1.022	.419	2.491
	Classroom based	1	.870	1.111	.315	3.923
	In a medical setting (such as the Medical Centre)	1	.295	.594	.224	1.576
	Social setting	1	.446	.284	.011	7.229
	Computer based	1	.196	5.080	.432	59.814
Constant		1	.002*	14.062		

* Statistically significant – <0.05

Summary: If participants believed that the health brief should be delivered before each operational tour, conducted by a Line Manager, and in smaller groups, this served as an indicator of whether they would experience illness or injury following the health brief.

4.5 Summary

The results show a demography that was mainly white males between the age of 18-25 with an average of GCSE's who were MFD and were on their 1st or 2nd tour.

The majority of the participants remembered the Health Brief and felt there was a need for it before the tour, although most did not receive a 2nd brief once on tour. The participants reported that they were neither attentive or unattentively during the Health Brief but thought the length of the health brief was about right, did not have a preference to group composition and would like it to remain in a lecture theatre, delivered by their own RMO. The majority knew how to protect themselves against illness and injury and did not take risks. Those participants who took risks did so with eating local food and not washing their hands. Very few were ill on the tour, and those that were, suffered from Diarrhoea and vomiting and musculoskeletal injuries.

Results that were common to all themes (behaviour change, attitude, risk taking and illness) were whether a participant remembered the health brief and perceiving a need for it.

The results indicate that factors such as remembering the health brief, perceiving a need for it, paying attention to it, finding its length appropriate, and rating it positively are associated with a higher likelihood of adopting or changing practices as a result of the brief.

The number of operational tours completed, remembering receiving a health brief, perceived need for the health brief, when the health brief should be given, days in theatre when receiving the health brief, length of the health brief, rating of the health brief, adoption of practice/change in routine, and risk to health despite knowing risks were all associated with paying attention to the health brief.

Participants who remembered receiving a health brief were less likely to take risks to their health.

Those who believed the brief should be given before every operational tour were more likely to take fewer risks compared to other groups. Participants who paid more attention to the brief were less likely to take risks compared to those who paid less attention. All suggestive of those that took the brief seriously were less likely to take risks.

Participants who found the brief too long were more likely to take risks compared to those who found it appropriate. Participants who believed their own Regimental Medical Officer or Unit Medic should deliver the brief were less likely to take risks compared to other groups.

Those who rated the brief positively were less likely to take risks compared to those who rated it negatively. Participants who adopted a practice or changed their routine as a result of the brief were less likely to take risks compared to those who did not.

Not carrying out advised sanitation procedures was the most common risk taken.

The majority of those who suffered from illness or injury believed there was a need for the health brief compared to those who did not. Those who suffered from illness or injury tended to pay more attention to the health brief. Participants who suffered from illness or injury were more likely to perceive the health brief as being about right in length. The majority of those who suffered from illness or injury reported that they knew how to protect themselves after the health brief. Those who suffered from illness or injury tended to rate the health brief higher.

Conclusion to the binary logistic regression:

Behaviour: The binary logistic modelling analysis shows that some demographics, perceived attention, and rating of the health brief significantly influence whether participants changed their behaviour. Age and ethnicity had some specific sub-group effects, while participants' perception of the length of the health brief and attention levels were strong predictors of behaviour change. Those who paid more attention or rated the brief more favourably were generally more likely to report behaviour changes.

The rationale for using Mixed Methods Research (MMR) methodology was discussed in Chapter 3 -Methodology, but the qualitative study enabled expansion and deeper investigation into the answers given in the quantitative study. Other qualitative methods could have been used but were discounted as discussed; One-to-one interviews provide the feelings and opinions of an individual but the views of the whole group were needed in this study as health information must be delivered in the most effective way to everyone deploying. The most effective methodology was therefore to use focus groups.

4.7 Qualitative Study Results.

The overarching research questions are whether the health brief resulted in the participants changing any health behaviours, what was their attitude towards the health brief, did they take any risks with their health or suffered any illness or injury during their tour.

As a reminder, the naming convention used for the participants is as follows: JSP are the Junior Ranks (Private, Lance Corporals and Corporals), SSP are comments made by the Senior Ranks (Sergeant, Staff sergeant and Warrant Officers), OSP are comments made by the Officers (Captains and Majors). Each participant was given a number, so a JNCO who was numbered 1 would have the code: JSP1.

The themes that were identified were behavioural change, attitudes, delivery, risk taking and illness, which will be explored below.

4.7.1 Theme 1: Behaviour Change.

This section presents the qualitative findings relating to behaviour and behaviour change among military personnel deployed to Iraq. Thematic analysis of the focus group data identified three interconnected themes that explain the limited behaviour change attributed to the health brief: the tendency of personnel to rely on experiential and peer-derived knowledge rather than formal guidance; the perception that much of the brief's content was patronising and redundant; and the absence of context-specific, operationally relevant information that reflected the actual conditions encountered in Iraq. Whilst two discrete areas of behaviour change were reported, the avoidance of stray animals and increased hand hygiene, the data suggest that neither can be attributed straightforwardly to the health brief

itself. Together, these findings point to a fundamental mismatch between what the health brief was designed to achieve and how it was received by the personnel it was intended to inform.

Experiential and Peer-Derived Knowledge as the Trusted Source

Across all three cohorts, participants relied more on peer advice, prior knowledge and experience, and knowledge gained in theatre than on the formal health brief:

"Well people talk to each other though and tell each other stuff." SSP2

"If you go on holiday you would ask mates." JSP1 which was also agreed by JSP4: "yeah, I phone mates if I'm going on hols so it was the same when we were gonna deploy." JSP4.

These show peer-verified information was the trusted alternative to the formal brief.

Where the brief's content could not be verified against direct observation or what colleagues had experienced, it was often unrelatable:

"Because it is sometimes hard to understand what they are briefing you about health risks when you are not there and you haven't seen Iraq before... I think the more detailed one [health brief] has to happen within the first week of deployment. When you are actually there, when you have a feel for the ground a bit more... then you can relate it." OSP4

This is important for understanding why the brief produced limited behaviour change, as it suggests that personnel did not view it as a sufficiently credible or relevant source of guidance to act upon independently:

"So we got there and half the stuff they were telling us wasn't even happening like you need to be in body armour... you get told one thing then do the other, doesn't make sense." JSP2

The rabies guidance was the exception to this pattern and is useful in understanding when the brief did influence behaviour. Participants across all cohorts reported avoiding contact with stray animals during deployment, which represented a genuine change from normal behaviour in the UK where interaction with domestic animals is commonplace. However, this compliance appears to have been reinforced by the direct experience of seeing free roaming, neglected, and visibly unhealthy animals within and around the camp, rather than

by the health brief alone. It was the visible presence of these animals that made the risk feel real and sustained the behaviour change. As one JNCO participant noted:

"The obvious we got told about, don't adopt a dog, they have rabies." JSP2

Personnel from other nations were reported to have adopted stray animals as pets, whilst the British cohort largely followed the order to avoid contact with them. This suggests that behavioural compliance occurred not because the brief was trusted on its own, but because what participants saw on the ground confirmed what they had been told. Where the brief's content aligned with observable reality, it gained credibility; where it did not, participants turned elsewhere.

This tendency to trust experiential knowledge over formal guidance is further illustrated by participants' accounts of eating locally sourced food. The health brief advised against this due to contamination risk, yet participants reported that this guidance was frequently not followed. Where colleagues had eaten local food without becoming ill, this was taken as sufficient reason to disregard the formal advice. The absence of visible negative consequences therefore carried more weight than the institutional guidance received before deployment. One SNCO participant reflected:

"We all knew it wasn't being made like five-star hygiene, but... so you took the risk and did your own risk assessment." SSP2

The same pattern of prior knowledge being applied over formal guidance is evident in participants' accounts of hand hygiene. Across cohorts, participants reported that they had not changed their hand hygiene behaviour as a result of the health brief, because they already knew to wash their hands and use sanitiser before the health brief was delivered. This prior knowledge of effective hand washing was not attributed to formal health training, but to everyday practice, it was what they did at home and continued to do on deployment. One JNCO participant stated:

"...its not rocket science, wash your hands" JSP5

Where the health brief covers ground participants already consider common sense, it risks being dismissed entirely, including any areas that might genuinely be new and/or operationally relevant. The participants did not hold back with comments like this:

"Spoken to like children, this was my first tour and I don't need to be told about D&V, and I don't think anyone else needs to either." JSP1

Another captured the same sentiment more directly:

"We are not stupid, we don't need a full day of briefings to say if you shit yourself don't spread it on someone." JSP2

The SNCO cohort echoed this, with one participant noting that the most useful health information on deployment came not from the brief but from colleagues and the medical team already in theatre:

"Most of the specific things I was curious about, I ended up asking the med team who were out there rather than being briefed before I got there." SSP3

Taken together, these three examples, animal avoidance, local food consumption, and hand hygiene reveal a consistent underlying dynamic. Military personnel enter deployment with an established base of experiential and peer-derived health knowledge, and they apply that knowledge as their primary reference point when making decisions about health behaviour in the field. The formal health brief occupies a secondary position in this hierarchy, gaining traction only where its content is specific enough to be recognised as relevant and credible enough to be trusted. This finding suggests that the brief's effectiveness is not simply a function of its content, but of whether that content can compete with the informal knowledge networks that military personnel rely upon far more readily.

Lack of Context-Specific and Operationally Relevant Content

A consistent finding across all three cohorts was that the health brief was perceived as a generic presentation, delivered in the same form before every operational tour regardless of destination. Participants reported that it was not specific to Iraq and that this left significant knowledge gaps in precisely the areas the health brief was designed to cover. Rather than

preparing personnel for the health risks and environmental conditions they would actually encounter, the brief covered broad, non-specific guidance that participants either already knew or could not relate to their deployment context until they arrived in theatre and experienced those conditions directly.

Participants across cohorts described encountering environmental and sanitary conditions that they had not been forewarned about and for which the brief had not prepared them. At several locations, personnel were required to dispose of used toilet paper in bins rather than flush it, generating fly infestations that posed a direct hygiene risk. The proximity of accommodation to ablution facilities, and the regular emptying of waste by tanker vehicles, created conditions that participants found both unpleasant and unexpected. One JNCO participant expressed this frustration directly:

"They don't tell you that your accommodation is right next to the ablutions and about six times a day a massive tanker comes along and empties out the black water." JSP3

Air pollution was similarly identified as a significant omission. Participants at multiple locations described persistent exposure to smoke and particulate matter generated by the burning of refuse, industrial waste, and materials such as helicopter batteries in close proximity to camp. This had a direct impact on respiratory health, yet it had not featured in the pre-deployment brief. One Officer recalled:

"My biggest concern was air quality, the dust, the locals burning plastics. I don't think the air quality was that good, and for the first month I had a sore throat." OSP3

The SNCO cohort were equally direct:

"That's one thing no one told us about, the air pollution." SSP2

Food hygiene in the operational environment presented a further gap between what the brief covered and what participants actually encountered. Whilst the brief advised against consuming locally sourced food, it did not address the practical realities of food preparation and hygiene standards within the camps themselves. At Camp B, participants described persistent gastrointestinal illness attributed to food prepared in kitchen facilities (run by another nation) that had not been adequately maintained, with the Environmental Health team having been denied access to conduct inspections. The dining facility was closed on at least one occasion following the discovery of a pest infestation. These were conditions directly relevant to DNBI risk, yet they fell entirely outside the scope of the brief's guidance. The consensus across cohorts was that the brief needed to move away from generic health advice and towards specific, location-relevant information that reflected the actual conditions of the deployment environment. Participants were not asking for more content, several explicitly stated that the brief was already too long, but for content that was targeted, credible, and directly applicable to where they were going. As one Officer stated:

"I think it needs to be made more specific, the way you look after yourself in terms of your health when you're away is not that much different to how you look after your health when you are at home. There are just certain aspects you take into consideration, whether that be rabid animals or heat, you just need to highlight those points rather than going over 'you need to brush your teeth twice a day, drink water'." OSP5

This view was shared across ranks. Participants did not object to receiving health guidance before deployment; rather, they objected to guidance that bore little resemblance to the environment they were about to enter. The implication is that the brief's lack of operational specificity not only left personnel unprepared for the conditions they encountered, but actively undermined confidence in its content, reinforcing the tendency, discussed in the preceding section, to rely on peer advice and in-theatre experience as more trustworthy sources of health information.

Cultural Obligations as a Barrier to Compliance

The qualitative data reveals two distinct areas where the operational environment undermined compliance with food safety guidance: social and cultural obligation, and the practical absence of alternatives.

Several participants described being placed in situations where refusal was not a realistic option. Eating with Iraqi counterparts carried the weight of hospitality and diplomatic courtesy, and declining food, however well-founded the health rationale, risked causing offence or damaging working relationships. One participant described attending the Iraqi Officers' Mess every week, framing it not as a choice but as an expectation:

"Sometimes you don't get a choice — 'come in, come in', you are just sat there, just eat that." OSP2

This extended beyond officer-level engagements. Another participant recounted attempting to refuse food after directly observing poor hygiene practice, only to be overruled by their own chain of command:

"I refused to eat one of the breakfasts but I got told off... I said SM [Sergeant Major] I'm not eating that and SM said why, I said I've just seen one of them licking the utensils clean... but he said I had to eat it. Went to the engineer place and they brought out food and it was all fish heads and that. I said naw but was told it was disrespectful so just eat it." JSP6

Here, the military hierarchy itself became the mechanism through which health guidance was overridden. The participant had both the awareness and the intent to comply with food safety advice, but was prevented from doing so by a superior rank deferring to cultural obligation. The health brief, in this instance, was rendered irrelevant not by ignorance but by a competing institutional pressure it had not equipped participants to navigate.

Taken together, these accounts suggest that the health brief's treatment of food safety was incomplete. Identifying a hazard is not sufficient if the guidance does not account for the social, cultural, and logistical realities in which personnel are actually operating. Where compliance depends on conditions the individual cannot control, the expectations of a host, the instruction of a superior and the absence of alternative food, the brief needs to go

further, offering practical strategies for managing these pressures or, at minimum, acknowledging that they exist.

4.7.2 Theme 2: Attitude

Attitude refers to individuals' thoughts, feelings, and predispositions towards a particular idea, behaviour, or experience. They are shaped by personal beliefs, past experiences, and external influences such as social norms and cultural expectations (Ajzen, 1991). In this study, attitudes reflect how military personnel perceived the health brief, whether they viewed it as useful, relevant, or ineffective and how these perceptions influenced their engagement with the intervention.

The research question surrounding the theme 'attitude' was: What was the military person's attitude towards the Health Brief? This is further broken down into the questions: Did the military person remember or pay attention to the Health Brief and was the content and delivery fit for purpose?

All the participants of the focus groups received the Health Brief as it was part of their Pre Deployment Training (PDT). During PDT they were required to 'sign in' on a nominal roll and would not be allowed to deploy if they had not completed all the PDT requirements. After their 6-month tour, some of the participants said they did not remember receiving a Health Brief or any of the contents. Some of the participants could recall parts of the brief such as:

JSP1: "I remember a little bit being said about wildlife, not much, D and V standard. I think that was about it really. Can't remember."

The main reason given for this was that they had received multiple briefs during PDT and they all seemed to merge.

Some of the participants said that they thought the brief they received once they had arrived in Iraq was more beneficial:

“OSP1: ‘I think the more detailed one [Health Brief] has to happen within the first week of deployment. When you are actually there, when you have a feel for the ground, then you can understand things a bit more, because it is sometimes hard to understand what they are briefing you about health risks when you are not there, and you haven’t seen Iraq before.’”

The participants reported that the PDT Health Brief was delivered shortly before they deployed to Iraq, describing a tight timeframe to complete all the training required.

JSP6: [PDT was a] ‘couple of weeks before we did the MRX [Mission Rehearsal exercise]. One because we did all the briefs then deployed on the MRX. Literature we came off [Exercise] WESSEX STORM, ploughed through all of that, and then straight onto leave, then straight out here. We weren’t even in camp for 3 weeks. Some blokes were straight out here’.

The participants were complaining that they had to assimilate a lot of information before they deployed and that it felt like a ‘tick box exercise’ according to one JSP1.

The cohorts were then asked about the logistics of the Health Brief delivery such as their opinion on the length of the Health Brief, the person delivering it and the venue.

The venue was reportedly a lecture theatre but the capacity it was designed to hold is unknown. The JNCO participants were very clear that this venue was not suitable in their opinion stating:

JSP2: There is no point being in a lecture theatre for the amount of time you have to – no point. ...It’s too long and you just switch off – no one wants to be there so you don’t listen to half of it. 7.30 in morning till 7 at night, you do your first 2 briefs then you switch off.

There were contradicting comments between the cohorts about the person (an Environmental Health Practitioner) who was delivering the Health Brief. The JNCO participants were quite damning saying that:

JSP1: "Aye he just couldn't speak up. He just mumbled the whole time. [I] could hear nothing." "I would definitely say they need to seem more enthusiastic."

JSP6: He wasn't enthusiastic. No, it was just I couldn't hear him. It's no point being in a brief for an hour if you can't hear. People go speak up.

JSP2: I don't think it was that branch or anything, I think it was his communication skills... weren't great.

JSP6: I needed binos [binoculars] to see it – true.

They reported that there were a lot of people in the lecture theatre (approximately Regimental strength which is 300 plus people).

The JNCO cohort said they would prefer a "Medic" meaning a Combat Medical Technician (CMT) to deliver the brief. A CMT would be attached to the Infantry Unit and embed themselves so therefore a trusted member of the team.

JSP6: "...a medic in general rather a crusty old Sergeant Major, get someone who knows what they are talking about [rather than] blattering off a Power Point Presentation."

So that brief was an hour long, and was in a lecture theatre.

The participants were very opinionated about the content of the Health Brief, with critically important discussions about the lack of information specifically on the conditions in Iraq. They mention not being told about the air pollution, poor sanitary conditions, and local wildlife (rabid dogs and snakes in particular) and were annoyed about this as is evident in this quote:

JSP6: "...they did not really share what it was going to be like in places, so like [Camp B] like sometimes you couldn't do anything due to the air pollution, but they don't tell you like Iraqis constantly burn stuff, and it comes fucking through the camp and with the air con and stuff, it gets in your fucking room. So they don't tell you stuff

like that, so you end up sitting in your room with a fucked chest, not in clip or anything but it's not pleasant is it."

One participant mentioned that lack of prior knowledge was an issue when they came across snakes, but they did not have the knowledge of how to deal with them:

JSP1: "I think from what I remember that brief was a bit too general, rather than being specific, you know like mentioning stray dogs and rabies is an obvious one but we had a couple of snakes that turned up and no one had a clue what to do, so I guess any snakes that are potentially going to kill you or whatever, you know instead of having a really broad oh yeah you will get D&V and Rabies you know the general stuff that everyone knows already."

One of the participants stated that they asked the advice of the medical team that was attached to them (about the water) rather than gaining this information from the Health Brief prior to deploying.

In addition to participants disclosing that they did not find the Health Brief helpful as it was not relatable to Iraq, they also thought that it gave them information that they already knew or that was "common sense" to them.

SP6: I just remember them going on about heat constantly. You know again that's what everyone knows how to manage anyway. Drink water!

The Health Brief conversely mentioned topics that were not relatable to Iraq such as Malaria. This caused some frustration as the participants felt like it wasted their time.

The participants thought the content of the Health Brief should concentrate on the health risks they were likely to encounter in Iraq rather than being generic to every Operational Tour:

JSP2: "You just need to know the specific details"

JSP1: "specific, shorten down the briefs".

The Officer cohort warned against elongating the PDT however as they said it was long enough.

4.7.3 Theme 3: Delivery of the health brief.

Delivery of health interventions such as the health brief refers to the way health-related programs, briefings, or initiatives are structured and communicated to participants. It includes factors such as timing, format, presenter, and group dynamics, all of which influence how the intervention is received and its overall effectiveness (Fixsen et al., 2005). In this study, delivery focuses on how military personnel view the delivery of the health brief which includes the venue of the power point presentation, timing (both when its delivered and the length of the presentation), the group make up and size and the person who delivered the health brief. The analysis draws on participant feedback to identify challenges and areas for improvement, emphasising the impact of health delivery methods on participants' engagement as discussed in Chapter 2 Literature Review.

Participants consistently highlighted the generic nature of the health brief as a key limitation. Many expressed frustration that the information presented was not tailored to the specific deployment context, such as the environmental and health risks unique to Iraq.

"It felt like they just copied and pasted the same brief from previous tours. We needed specific advice for Iraq, not general health tips." OSP3

"We got a big spiel about mosquitoes, and then at the end, they said, "Oh, there are no malaria mosquitoes here." Why spend so much time on that?" JSP2

Participants indicated that much of the content, such as advice on hand hygiene and diarrhoea and vomiting prevention, was redundant or self-explanatory. This lack of specificity reduced the brief's perceived relevance and caused many to disengage.

The timing of the health brief emerged as a critical factor influencing its effectiveness. Participants suggested that receiving general information during PDT was necessary but emphasised the need for a follow-up, more detailed briefing once in theatre.

“It’s important to at least get something before you deploy, but a detailed brief when you’re actually there and can relate it to the ground would make more sense.” JSP1

The current practice of delivering all information during PDT, often weeks before deployment, was seen as insufficient for addressing location-specific risks and challenges.

“We used to get briefs in theatre right off the plane, “don’t touch this, don’t eat that”, which stuck better because you could see the risks around you.” JSP1

The physical setting and format of the brief also impacted its effectiveness. Many participants attended the brief in large lecture halls, which were crowded and poorly suited for interactive learning.

“I was sat at the back, and I couldn’t hear a word. He just mumbled the whole time, and the slides were impossible to see.” JSP4

Participants suggested smaller, more interactive sessions to ensure everyone could engage with the material and ask questions as needed.

“It’s no point being in a brief for an hour if you can’t hear or see anything. People just switch off.”

A point that was clarified by one of the Officer was that some of the Junior ranks had chosen to sit at the back when there was space actually at the front. This can be described as the military personnel having a herd mentality. Herd mentality is the instinct to follow the crowd, often without question. The participants had to conform for military discipline reasons but they would have also not wanted to have stood out, letting group influence override individual judgment. Herd mentality is rooted in social influence theories, particularly Social Contagion Theory, which suggests that behaviours and emotions spread through groups much like a virus. Social Identity Theory (Tajfel & Turner, 1979) reinforces it, showing how

people define themselves through group belonging, while Conformity Theory (Asch, 1951) and Imitation Theory (Tarde, 1980) highlight the tendency to mirror those around us, especially in uncertain situations. Herd mentality in this case resulted in the participants being unable to fully appreciate the health brief.

The delivery style of the health brief was a recurring source of dissatisfaction. Many participants described the sessions as monotonous and unengaging, often delivered by individuals lacking enthusiasm or effective communication skills.

“the bloke delivering it was boring as hell. People were fighting sleep. No one wants to sit through that.” JSP2

“the content might be important, but if the person delivering it can’t keep you awake, you’re not going to remember it.” JSP4

Participants expressed a preference for delivery by individuals with recent deployment experience, but still a medical professional such as medics or Environmental Health Officers, who could provide credible, relatable, and engaging insights.

“Would it be good if the medic who had just been out there gives it. JSP4

“Yeah as they have just spend six months there. Makes sense!” JSP2

Participants offered suggestions that could be actioned in their view, which would enhance the delivery of the health brief. There was discussion about incorporating scenarios, role-playing, or practical demonstrations to make the content more engaging and memorable.

“Instead of just reading off slides, give us a scenario, like “everyone in your room is sick, what do you do?” That would stick better.” SSP5

Suggestions also included the use of digital integration. Developing apps or digital tools to supplement the health brief, with location-specific information and interactive components was popular.

“If you had an app with the information and a quick test at the end, people would actually use it because no one likes failing tests.”

Conversely though, the Junior military personnel did not like the idea of using their personal electronic devices for “work”.

The Junior military personnel also said they preferred if the brief was delivered in smaller, more focused sessions to improve communication and engagement opportunities.

‘smaller groups in a room like this, where you can actually hear and ask questions, would be better.’ JSP2

Participants reported that critical location-specific risks, such as air pollution, waste disposal practices, and local wildlife hazards, were either inadequately addressed or omitted entirely.

‘they did not tell us that the air was full of burning plastics and that it gets into your room.

That’s the kind of thing we need to know.’

The lack of detailed, practical advice left participants feeling unprepared for many of the challenges they faced during deployment.

The findings highlight significant limitations in the delivery of the health brief, including generic content, poor timing, disengaging delivery methods, and logistical barriers such as venue size and accessibility. Participants emphasised the need for tailored, location-specific information delivered through new modern interactive methods. Addressing these shortcomings could enhance the effectiveness of health briefs, better preparing military personnel for the health risks associated with deployment.

4.7.4 Theme 4: Risk taking.

One of the research aims was to explore if the participants took any risks to their health despite the warnings presented in the Health Brief. Additionally, if they admitted they took a risk, why did they?

The Researcher asked the question *“Did you take any risks?”* and participants in all three cohorts comment that they had eaten local food, therefore making the connection that this was risky. None of the participants mentioned that they remembered the subject of

avoidance of local food or food borne illnesses from the Health Brief, so this may have been prior knowledge. This highlights a knowledge gap however, which is why they ate local food. The reasoning for taking this risk was twofold; to prevent cultural offence (either an individual or Chain of Command decision) and because of convenience. The participants seemed very culturally aware which is important if they were to fulfil their mission goal in Iraq, which was to train the local population. Cultural awareness was demonstrated by the participants when they accepted local food when offered, despite not knowing if it had been prepared and stored correctly. In some cases, the JNCO participants identified that the food or equipment cleanliness might not be up to British standards but still felt like they had to accepted it:

JSP1: "...and then like in the HQ place they was always offering you food and that and it's minging like...

JSP6: "...but you don't want to say no do ya."

JSP1: You see them washing trays then you have to eat off them.

This was equally felt within the Officer Cohort:

OSP3: Yeah there is also the problem there where you couldn't have physically said "no" for fear of offending them but if I hadn't have been, I would have had no choice.

The second reason why the participants reported taking a risk by eating local food was due to the convenience. There was a Falafel place which was frequented by the participants for the following reason:

JSP1: 'that's the only food you had access to. So we have really early starts, the armoury at 0645 or 0530 but we were still out till lunch in the heat, so I was not really doing a risk assessment but you are hungry and there was nothing else to eat.'

The participants reported that they weighed up the pros of cons of eating at a local establishment and concluded that if the product was hot and cooked in an “actual kitchen” that they would take the risk. Participants also described consuming local food not out of obligation but necessity, when no alternative was available:

The participants seemed to have some knowledge on high risk food’s for food poisoning and made comments such as:

OSP2: Something like for e.g. the falafel wrap, it’s not like its pink meat or anything”

Once again though, this could have been prior knowledge as the participants did not mention that they gained this knowledge from the Health Brief.

The Officer cohort also mentioned the cross-contamination risk they had come across and how they had dealt with it but did not credit the Health Brief for any hand hygiene revision:

OSP3: “there was a lot of hand shaking and stuff. A lot of people are just consciously not putting your hand in your mouth before sanitizing or washing your hands and stuff like that.”

There was a sense of resignation and acceptance of risk among the individuals interviewed. They acknowledged the risks of illness and other hazards but reported that they often felt compelled to accept these risks due to circumstances or cultural expectations. This resignation appeared to extend beyond risk specifically, reflecting a broader disposition within military culture towards "getting on with it" regardless of adversity, whether physical, psychological, or logistical. This pattern is consistent with the wider literature on military stoicism, which has repeatedly identified a cultural expectation to endure difficulty without complaint or disclosure, often summarised by participants themselves in blunt terms; Williamson et al. (2025), for example, found that UK ex-serving personnel described this expectation as being told, in effect, to "man up and get on with it", even in relation to significant psychological distress. Within this research, this same disposition appeared to be applied not to distress specifically, but to everyday occupational risk: participants did not necessarily view accepting risk as a deliberate choice weighed against alternatives, but

rather as an unremarkable extension of a broader military identity in which enduring hardship, tolerating discomfort, and continuing regardless are treated as baseline expectations of the role, rather than as notable acts of resilience.

4.7.5 Theme 5: DNBI.

This section uncovers the experiences of military personnel regarding their DNBI, and that of their colleagues during their deployment. The findings indicate that while participants seemed to expect some DNBI, some were either underestimated, inadequately briefed so they were not prepared for them, or beyond individual control. Common topic of discussion that emerged from the focus groups include the incidence of gastrointestinal illnesses (Diarrhoea & Vomiting (D&V) cases) which they linked to food contamination, respiratory issues they assumed was due to the air pollution, musculoskeletal complaints resulting from physical training and the effectiveness of medical support.

Gastrointestinal Illnesses and Food-Related illness

The participants did not believe there was a high prevalence of DNBI either in themselves or their regiment during the deployment, however contradicting this view, the researcher asked if a lot of people were ill, and the response was:

"Yeah, oh yeah, bellies were rough all the time. You'd go for food, and then half an hour later you are on the toilet, but that was standard." SSP 4

This comment was specifically referring to Camp B where participants reported that everyone suffered from D&V after eating the food there, but it seemed to be accepted as the norm. The D&V was presumed by the participants to be related to poor food hygiene practices and equipment in Camp B as the camp was not run or maintained by the British military. Military personnel coined the term "B**** Belly", indicating a widespread and persistent issue within Camp B. An attempt to improve the food hygiene and reduce D&V in Camp B was refused:

"EH [A military Environmental Health Practitioner] tried to inspect it [the Regimental Restaurant in Camp B], but they were turned away. It's disgusting. Whilst we were there, they got some new kitchen equipment, took out the old stuff, all the stuff they took out was full of grease. It was disgusting. We omission our food cooked on that." JSP6

Environmental Health Hazards and Air Pollution

In addition to food-related illnesses, environmental factors concerned the participants, particularly the alleged poor air quality. Air pollution was repeatedly mentioned as a serious issue, particularly due to the locals burning waste and industrial emission exposure.

Military personnel in Camp B and Camp T noted constant exposure to airborne contaminants, exacerbating respiratory issues.

*"I was down in B***** [Camp B] for the first half of the tour, about two to three miles from a brick factory, and as a regular occurrence, you would get these huge layers of fog. We were given masks, but they were just the paper ones that get saturated immediately." OSP2*

Musculoskeletal Injuries

The deployment involved training Iraqi Forces rather than being a Kinetic tour so there was opportunity for the military personnel to take part in sports and use the gym in camp in their spare time. Inevitably this caused some musculoskeletal injuries that are recorded as DNBI cases. The participants mentioned that they had no recollection of the risks of musculoskeletal injuries and their prevention mentioned in the health brief. One participant thought an important piece of information which would have reinforced the actions to take when suffering from an injury was omitted. The advice is to not continue to carry out physical training if an injury is present but one of his soldiers had an issue due to this:

“One of my soldiers had an ankle injury but continues to run with the rest of the guys which made it so much worse. He ended up with it taking more time to heal as he was an idiot in the first place. “Although no one said to him that he shouldn’t carry on I suppose, and the infantry mentality to just get on with it took over” OSP5. This is an interesting statement as the fact that “no one said to him that he shouldn’t carry on” shows an absence rather than active pressure, it is what wasn’t said, not what was said, that the participant identifies as decisive. The participant says “I suppose” suggests they are reasoning in the moment rather than having a feasible explanation. Responsibility then shifts when he says: “the infantry mentality... took over” which displaces responsibility from the individual onto an abstract cultural force. Alongside the participants earlier comment that the injured soldier was “an idiot in the first place,” this shows responsibility being actively relocated, moving from the culture back to individual blame.

Medical Support and Force Health Protection Efforts

There were comments that praised the medical teams that deployed with the participants who stated that they would reinforce Force Health Protection themes throughout the deployment including hand sanitation and drinking water to prevent heat illness.

“ Yeah the Doc was constantly going around making sure we knew about heat illness and stuff like that. They were good, the med team like” SSP1

This activity cemented the trust the participants had for the medical teams that deployed with them.

Whilst participants who suffered from DNBI reported to their medical facility for treatment, there were mixed opinions on the adequacy of medical support. Some found medical support was inconsistent, particularly when personnel sought treatment for persistent illnesses:

*"I asked the medics for something, but they said no. I said 'cheers for that, c***, I'm up spewing here.'"*

Another major concern was the management of D&V outbreaks, which varied by camp. In Camp T, affected personnel were quarantined in separate pods, whereas in other locations, outbreaks were not actively contained:

"Where I was last week, they had a big outbreak of D&V, but we don't segregate or anything. They just let it happen."

This lack of consistency in cross infection measures suggests that policy enforcement may have been dependent on local leadership rather than standardised military medical protocols. It is likely to undermine willingness to adhere to the health brief in several ways. It sends an implicit signal about how seriously the guidance is actually taken by the CoC enforcing it. If isolation protocols are applied in one location and ignored in another, personnel moving between camps, or simply hearing accounts from those who have, may reasonably infer that the rule is discretionary rather than genuinely necessary, regardless of what the health brief itself states. This risks the same credibility issue identified elsewhere in this theme in relation to irrelevant brief content (the malaria/mosquito example):

It also weakens the descriptive norm that would otherwise support compliance. Personnel who observe that isolation is not consistently expected or enforced around them have less reason to isolate themselves when advised to, since the visible behaviour of the wider group signals that the rule is not, in practice, a shared standard.

Finally, inconsistency of this kind may reduce individual protective behaviour generally. If whether D&V spreads through a camp appears to depend more on local leadership discretion than on any individual's own actions, personnel may reasonably conclude that their personal adherence to health brief guidance has limited bearing on their actual risk of illness, reducing the perceived value of compliance even where they are, in principle, willing.

Taken together, these effects suggest that inconsistent enforcement is unlikely to affect willingness to follow the health brief in isolation; rather, it is likely to interact with, and potentially undermine, several of the specific facilitators identified elsewhere in this thesis, namely, perceived source credibility, social norms, and a sense of personal control over health outcomes, each of which was found to support engagement with health advice in this population

DNBI Prevention and the Health Brief

The general perception among personnel was that most health risks were common sense, and pre-deployment health briefings did not adequately prepare them for the realities on the ground.

The participants stated that they would have liked information in the health brief that was specific to the conditions and diseases in Iraq, and that some topics were not even mentioned but proved to be very important in their opinion.

The findings indicate that DNBI risks were a common part of deployment, with gastrointestinal issues, air pollution, and environmental hazards being the most frequently reported concerns. While some risks were unavoidable due to operational demands, others could have been better mitigated through improved PDT health briefs, more effective infection control measures, and more responsive and compassionate medical support.

4.8 Chapter Summary.

Participants expressed frustration with the general and non-specific nature of the health briefings, desiring more relevant and detailed information, particularly about specific risks and precautions related to their deployment location. They indicated a willingness to adapt their behaviour to mitigate health risks, such as avoiding contact with animals and improving hand hygiene. However, they also felt that some of the information provided was unnecessary or already known to them. Overall, there was a consensus that the briefings did not adequately prepare them for the realities of their deployment environment.

Participants had varying levels of recall and engagement with the health briefings received during their pre-deployment training (PDT). Some participants remembered only parts of the brief, while others found it difficult to pay full attention due to issues with delivery and the volume of information presented. There were suggestions for improving the timing, content, and delivery of the briefings, with some participants feeling that a more detailed briefing upon arrival in the deployment location would be more beneficial.

Despite warnings presented in the health briefings, participants admitted to taking risks to their health, such as consuming local food, primarily due to cultural considerations and convenience. There was a sense of resignation or acceptance of these risks, with participants weighing the perceived benefits against potential health hazards.

Participants reported experiencing various health issues during their deployment, including respiratory issues, gastrointestinal problems, and musculoskeletal complaints. While they praised the medical teams deployed with them for reinforcing health promotion themes, there was a sense of resignation regarding illness, with participants acknowledging it as part of the reality of their deployment.

INTERGRATION OF RESULTS

4.9 Integration of Results.

It was critical that the quantitative and qualitative methods integrated in this research following the MMR an explanatory sequential design (Creswell 2015) as this approach was fundamental to the purpose of employing MMR.

As explained in chapter 3 – methodology, the data were collected via quantitative questionnaires and qualitative focus groups which were analysed separately. An excel database was produced which displayed both forms of data in one place which facilitated comparison and subsequent deeper investigation. This was done by triangulation of the data using a side-by-side comparison method which enabled identification of areas where the data converged, diverged, or was complementary to each other. The data converged when the findings from the quantitative and qualitative studies lead to similar conclusions,

increasing confidence in the results and providing mutual validation (Creswell & Plano Clark, 2018). Divergence was when the findings differed such as diverse viewpoints or experiences, which is important to include in this integration section as this can provide further dimensions from the themes being studied and also shows the value of MMR at capturing complexities in behaviour (Teddie & Tashakkori, 2009). Complementarity occurs when the findings provided different but interrelated insights which in turn enriched the understanding of the theme. Greene et al (1989) describe complementarity as a strategy which can even elaborate, enhance or clarify results between the two quantitative and qualitative methods. The side-by-side comparisons were organised by the five themes of behaviour change, attitudes, risk taking, health brief delivery and illness suffered for clarity in reporting which are presented below.

Theme 1: Behavioural Changes.

Convergences.

The findings of the quantitative and qualitative studies found no significant behaviour change as a result of the health brief. The quantitative results showed that only 37.3% of participants reported that they adopted a change to their health behaviour, which demonstrates a failure of the health brief especially when compared to behaviour change interventions in public health. As mentioned in Chapter 2 literature review, there is limited research on health behaviour change in the MoD but other health interventions have shown a significantly larger behaviour change impact than in this cohort. The health interventions include encouraging “10,000 Steps” workplace walking program which showed 65% of participants changed their behaviour and increased their daily steps by at least 2,000 (Croteau et al, 2004), and “Dietary Changes for Cardiovascular Health” intervention which saw 75% of participants reported sustained reduction in sodium intake and 82% increased daily servings of fruits and vegetables (Sacks et al, 2001). Compared to these figures, the health brief failed. The quantitative data are consistent with the comments from the focus group participants. The focus group participants elaborated saying that they did not change their behaviour particularly as it was common sense. This points to a potential mismatch between the

content of the brief and the participants' perceived needs. If the content is too basic or patronising, it risks being dismissed or undervalued by the participant (Petty & Cacioppo, 1986, Witte 1992, Nutbeam, 2000). The implication of this is that the health brief's effectiveness is undermined when its content does not resonate with the participants' perceived level of expertise or relevance. Making sure the content is specific to Iraq to match the participants' expectations and context-specific challenges, could enhance its impact so participants take more notice.

The studies also converged on the view that the participants knew how to protect themselves against DNBI on the tour. Nearly all the participants (92%) indicated this in the quantitative study, and it was discussed at length in the focus groups, with comments describing how they may have increased their hand washing frequency but they already knew they had to do this before receiving the health brief. The convergence that most participants did not change their behaviour because they already knew how to protect themselves suggests that the health brief reinforced existing knowledge rather than introducing new concepts. This indicates that the health brief may have limited utility in driving behavioural change for individuals who are already well-informed. The implications of this are that the health brief may have been effective as revision or a reminder for the participants, rather than as a transformative (behaviour change) educational/knowledge intervention. Given the lack of attention reported and difficulties with the delivery of the brief itself, this may also not be the case.

Revision might be beneficial, but it is not the primary aim of the health brief which is behavioural change where military personnel adhere to good health practices when overseas.

[Divergences.](#)

The focus group findings showed that participants thought the advice in the health brief on rabies was important and interesting, but the questionnaire did not ask participants about specific topics from the health brief. The contents, including the risk of rabies, in the health brief is mentioned a lot in the qualitative focus group showing the importance and value of

specific, location-relevant information. However, it would be interesting to find out through a future survey whether this is true for the wider cohort. This would have benefited from an adjustment in the MMR design to be sequential, meaning one study would be analysed before moving onto the next ensuring overlap in the questions.

Complementarity.

As stated above the quantitative findings showed participants did not change their behaviour as a result of the health brief but the qualitative focus group discussions provided a deep insight into some of the reasons for this, providing complementarity. Potential barriers to adopting a behaviour change the focus group participants mentioned, were that it was difficult to follow good health behaviour due to cultural sensitivities as they were being offered food and drink by the locals, but the health brief warned not to consume local food or drink. This suggests that the health brief was ineffective in identifying and addressing context-specific challenges. The implication of this is that the health brief must include strategies for overcoming cultural and situational barriers to behaviour change. These could include providing practical guidance on how to navigate social interactions while adhering to health recommendations, such as accepting food that is hot (which will kill most bacteria) rather than that which has not been cooked.

In summary, the convergences suggest that the health brief was effective in reinforcing existing knowledge and encouraging adherence to known good health practices, however, its potential for behavioural change in this cohort was limited. The limitations were that the health brief was not specific to Iraq, the advice was not what the participants needed as they already knew it but there were no strategies for addressing cultural and contextual challenges on the tour.

Theme 2: Attitudes towards the Health Brief.

Convergences.

The participants attitude towards the health brief was explored using the following questions in the quantitative questionnaire: Do you remember receiving a health brief? Do you think

there is a need for the health brief? Overall, on a scale of one to five how much attention did you pay to the health brief? Overall, what number would you use to rate the health brief? The participants also addressed these questions in the focus groups. These will now be discussed individually where there was convergence. 73.2% of participants remembered receiving the health brief and the majority of the participants in the focus group said they remembered the health brief, indicating that the health brief is a prominent component of pre-deployment preparation; however some needed a prompt to remember. Once prompted the focus group participants recalled the health brief giving example of the content presented including the wildlife threats and diarrhoea & vomiting risks and some of the prevention messages such as hand washing advice. The need for a prompt to recall memories during the focus groups indicates that while participants recall the brief, it may not have generated a significant or enduring impact, and their engagement with it may be superficial. Additionally, all participants agreed that there was a need for a health brief, with 76.9% reporting 'yes' there is a need for a health brief in the quantitative results, whilst the focus group participants agreed. This suggests a baseline acknowledgment of the importance of receiving health-related information, reflecting a positive attitude that such preparation is a vital part of deployment readiness. Comments from the focus group centred around the health brief not being specific to Iraq though. This indicates that while participants value the concept of a health brief, they are critical of its current implementation. They desire a more tailored and contextually relevant content. Both data sets highlight dissatisfaction with the generic content that participants feel does not align with specific deployment health threats. This theme is reoccurring and will be addressed later.

[Divergences.](#)

The quantitative findings showed a range of attention levels (with participants rating their attention on a scale), while qualitative feedback highlighted factors affecting engagement, such as brief fatigue and overloading due to multiple power point presentations delivered on the same day. The quantitative study reported that 36.1% thought the health brief was 'excellent' or 'good' and if added to those that rated the health brief as 'neither good nor bad'

(44.4%) makes up 80% of the participants that had a positive or neutral view of the health brief. This is a divergent view from the participants in the focus groups who did not think that the health brief was useful at all, giving damning critiques of the content relevance and delivery of the health brief. This divergence suggests that while participants do not outright reject the brief, they view it as a missed opportunity for meaningful and practical health guidance. Their attitudes might reflect resignation or moderate approval rather than genuine satisfaction. These divergences further suggest that while participants recognise the health brief's importance, their engagement may be hindered by external factors. These qualitative insights suggest that quantitative participants who rated the brief "neither good nor bad" or positively may have been assessing its perceived necessity rather than its practical utility or content relevance. Quantitative participants may have rated the health brief more positively than qualitative participants as they did not have means to elaborate but there could have also been a differing interpretation of the questions or recall bias that could explain this divergence.

Complementarity.

The quantitative study provided data where a large number of participants rated the health brief as "neither good nor bad" (44.4%) which can be construed as the participants not being completely happy with the health brief but not be able to expand on the reasons why. The qualitative insights provided further details about why the participants had that attitude towards the health brief. These included some delivery nuances which will be discussed in theme three below, the amount of other briefs the participants had received in the same day and that they felt the health brief was unnecessary. Participants criticised the timing of the brief, which was delivered alongside multiple other briefings, leading to cognitive overload. They also noted cultural mismatches in the advice provided, such as warnings against consuming local food or drink, which conflicted with cultural expectations of the Iraqi hospitality.

In summary, these convergences reveal that participants have a generally pragmatic attitude toward the health brief in that they see it as mandatory training so “have to” attend and are critical of its execution but appreciate its intent. The findings highlight a gap between the participants’ expectations for deployment-specific, actionable advice and the actual content and delivery of the brief. This underscores a need for refinement to improve both the relevance and engagement of the health brief, which could lead to stronger positive attitudes and better behavioural outcomes.

Theme 3: Delivery of the Health Brief.

Convergences.

Both the quantitative and qualitative studies agree that the duration of the health brief was acceptable, but there was inadequate delivery style in their opinion, lack of specificity in the content and the venue was an issue. Firstly, the majority of the quantitative study participants (63.1%) reported that the health brief was about right duration wise and the qualitative study comments agreed with this but mentioned that it was often part of a long series of presentations which lead them to disengage. One of the participants of the focus group said “0730 in the morning until 0700 at night, you do your first two sessions, then you switch off.” The same focus group participants suggested trimming non-essential content and focusing on critical health information to combat briefing fatigue.

Divergences.

There were divergences with regards to the timing of the health brief with the majority (66.8%) of the quantitative participants reporting that it should be delivered before each tour and 19% thought it should just be delivered on the high tempo tours. This was in contrast to the qualitative study findings where participants suggesting it was either too early in the pre deployment training schedule as they had forgotten most of it by the time they deployed, or delivered amidst other briefs, leading to cognitive overload as discussed earlier. The groups preference seemed to be to receive a general brief before the deployment to prepare for packing and general health precautions, but receive a more detailed, location-specific brief

upon arrival in theatre. This then contradicts comments from the focus groups that the health brief should be specific to the location of the tour.

There was another divergence of views with regards to the delivery methods used to present the health brief. The quantitative study results indicated that a lecture theatre (57.6%) or classroom based (18%) were the most popular choices for the venue to deliver the health brief over a social setting, computer-based e-learning or in a medical setting. The focus group participants did not agree with this and widely critiqued the power point presentation style of delivery as ineffective saying it was “monotonous and not engaging”. Participants struggled to hear or see the presentation in large venues and suggested smaller groups, more interactive sessions, scenarios or story-based teaching (e.g., role-playing responses to health risks like D&V outbreaks) and the use of handouts, apps, or digital resources for accessible, on-demand reference. Large lecture theatres were criticised for their inability to foster engagement or ensure everyone could hear or see the content. One participant said “I couldn’t hear a word. I was sat at the back watching his lips move.” Smaller groups were suggested by the focus group participants but 63.1% of quantitative participants had “no preference” to group size and make-up. The presenters were described as lacking enthusiasm, with comments such as “the RAF bloke was boring”, however the quantitative study results found that 81% of participants would be happy with a medical professional delivering the health brief such as the person who delivered the health brief for their tour.

[Complementarity.](#)

Most importantly (as it has been mentioned numerous times in the focus groups), the participants of the qualitative focus groups emphasised that the content of the health brief was seen as overly basic and patronising commenting that “We don’t need a full day of briefings to say if you shit yourself, don’t spread it on someone.” Participants preferred a focus on unique deployment-specific risks rather than “common sense” advice. Participants consistently expressed dissatisfaction with the content of the health brief not being operationally focused, such as ‘the brief was a bit too general, rather than being specific...’. Advice like “you will get D&V” was seen as obvious and insufficiently tailored to deployment-

specific risks, such as dealing with local snakes or cultural practices, which the participants came up against. Specific questions on content of the health brief were not included in the questionnaires which was admittedly an omission, so this would be worth including on future studies.

Theme 4: Risk Taking

Convergences.

Both data sets indicate that risk-taking is prevalent, highlight a perception that risk-taking is an accepted part of prevailing social norms within military culture. Actions such as eating local food, for example, were framed as gestures of goodwill, potentially overriding the guidance provided in the health brief. This demonstrates how the social context influences behavioural decisions (Ajzen, 2005).

The quantitative data reports that 26.4% of participants said “yes” they took a risk with their health. Although this seems like a small percentage, the operational implications are significant as this equates to over a quarter of the Military personnel deployed who could have succumbed to an illness or injury through taking a risk. If the workforce is reduced to this extent, this would impact the mission aim and put the medical chain under pressure. The qualitative focus groups discussion confirmed that participants took risks, giving details of the dangers that were mainly eating local food (falafel from a local vendor or being offered it by the locals) and not carrying out adequate hand hygiene. The quantitative results corresponded with this, with the largest percentage (12.2%) agreeing that not carrying out advised sanitation procedures (like hand washing before eating) and eating local food (5.8%) being the top two risks that were taken. The qualitative study findings were that adequate facilities were provided for hand washing, but they were located centrally, which in some camps was inconvenient before eating. The findings also explained that participants did their own “risk assessment”, giving an insight into their potential or perceived prior knowledge and autonomy levels. The findings suggest that participants accepted these behaviours as “low-risk” through their own risk assessments. Accepting food from locals, for instance, was often viewed positively as a culturally sensitive act, despite the associated health risks. This

perspective aligns with TPB, which highlights how individuals evaluate their actions' potential benefits and drawbacks (Ajzen, 2005). Participants seemed to prioritise social and cultural benefits over health risks in this case.

Divergences.

14.6% of participants in the quantitative study said they were unsure if they had taken a risk. This could imply that they did not understand the question, the question did not provide the options for them to choose from, they did not know what constituted a risk or could not remember if they had taken a risk or not. In contradiction to this, the focus group participants were confident in their understanding of the risks, suggesting those engaging in risky behaviour did so knowingly. This highlights the gap in the alignment of participants' self-perceived knowledge and their ability to recognise risky behaviours.

A statistically significant relationship ($P=0.001$) was found between not taking risks and not making behavioural changes due to the health brief, suggesting participants relied on prior knowledge. The qualitative findings, however, mentioned that the health brief was generic, yet others highlighted cultural pressures (e.g., accepting local food) as a risk-taking driver. This divergence points to a disconnection between the generic content of the health brief and the specific situational challenges participants face.

Complementarity.

The focus group insights provide further details on why the health advice was not always followed, such as time pressures during missions. The qualitative data also explains why participants knowingly engage in risky behaviours, such as the cultural sensitivities of accepting food kindly offered by local people, adding depth to quantitative trends.

In summary, risks were taken, but participants explained them away. These findings highlight the norms and perceived control in influencing participants' decisions, offering critical insights into how health behaviours are shaped in a military context and relate to TPB (Ajzen, 2005).

Theme 5: Illness Suffered

Convergences.

Both data sources confirm that there were DNBI cases on the tour, but a small percentage (22.7% reported suffering from a DNBI. The RFN focus group gave details of some D&V cases especially in Camp B, and the Officer focus group mentioned one individual who had a musculoskeletal injury to his ankle. Still, the SNCO focus groups did not highlight any particular occurrences.

Divergences.

A statistically significant result was not indicated when a test of association was conducted in the quantitative data between those with no behaviour change and those who did not suffer from DNBI whilst on the tour. An assumption from this is that participants were not necessarily ill if they did not change a behaviour due to the health brief, indicating that this is not important. This raises questions about other factors influencing DNBI incidence, such as individual immunity, equipment provided, infrastructure and the environment, or the adequacy of pre-deployment health measures.

Complementarity.

The qualitative data identifies specific environmental challenges that hinder adherence to hygiene advice. The focus groups provided some practical solutions absent in the quantitative findings.

In summary, the DNBI rates were in line with EpiNATO data on other operational tours of this type in this country. There is no linkage between the illness suffered and those that did not make a change in health behaviour.

CHAPTER 5 - DISCUSSION

5.1 Chapter Introduction

This chapter critically examines the findings of the study and integration results about the research aims, existing literature, and theoretical frameworks. It evaluates the effectiveness of the health brief in influencing behaviour change among British military personnel, explores

attitudes and risk-taking behaviours, and discusses the limitations of the intervention's delivery. The findings are positioned within the broader scope of health behaviour theories, highlighting implications for policy, practice, and future research.

The research question addressed in this thesis was: "What are the attitudes and behaviours of military personnel toward a pre-deployment health intervention (the health brief)?"

To achieve the aim, the following research objectives were developed:

Objectives:

1. Assess behaviour change linked to the health brief: To identify if the participant reported changing their behaviour as a result of the health brief.

This objective provides a foundation for understanding the health brief's effectiveness.

2. To explore the participant's attitudes towards the pre-deployment health brief.

This objective assesses whether attitudes are associated with disengagement from the health brief.

3. To investigate participants' reported DNBI and their condition.

This objective focuses on understanding if and how the health brief provided knowledge on DNBI to prevent participants from suffering from an illness or injury.

4. To evaluate participants' perceptions of the method and delivery of the pre-deployment health brief.

This objective aims to assess the suitability and effectiveness of the delivery format of the health brief as perceived by the Military personnel, including any feedback on its content, accessibility, and mode of communication.

5. To explore the underlying reasons behind any risk-taking behaviours related to health during deployment.

This objective seeks to uncover the factors that may lead military personnel to engage in health-risk behaviours, despite the health advice provided in the pre-deployment health brief.

5.2 Summary of key findings.

The top four key findings were:

1. Limited impact on behaviour change: Despite attending the health brief, most participants did not significantly alter their behaviour. Only 37.3% reported making any changes, and focus groups reinforced this by describing the information as 'common sense' rather than practical or actionable advice.

2. Participants saw the health brief as necessary but criticised its delivery: While 73% remembered attending a health brief, and 76.9% agreed it was needed, but many were dissatisfied with its presentation. Some struggled to see or hear the session properly; others felt disengaged because the content did not feel relevant or engaging.

3. Prior knowledge impacted the perceived value of the brief: A significant majority (92%) already felt confident in protecting themselves from illness or injury. As a result, many dismissed the brief as unnecessary.

4. Risk-taking and illness on tour: 41% admitted having engaged in risky behaviours such as poor hand hygiene (12.2%) and eating local food (5.8%), but only 22.7% reported falling ill while on tour, with musculoskeletal issues (10.5%) and gastrointestinal problems (4.4%, diarrhoea and vomiting, 2.4% stomach cramps) being the most common.

These findings suggest that while the health brief is deemed necessary, it often fails to engage personnel or influence their behaviour.

5.3 Discussion.

This section will provide a broader discussion of the participant demographics and then focus on the findings from the studies using the five themes (behaviour change, attitudes, delivery, risk taking and illness).

5.3.1 Demographics.

The demographic breakdown in the quantitative study includes the participant's age, ethnicity, rank, qualifications, corps, medical status and the number of operational tours. These data were collected as it appeared in the Op TRENTON questionnaire, which was

used as a template, but more pertinent is that the demographic breakdown of participants is critical for analysing behavioural patterns.

Considering the demographics that influence behaviour, research consistently shows that age influences risk perception and decision-making. Younger individuals often exhibit a higher risk tolerance than older individuals, who tend to prioritise caution due to experience and maturity (Reniers et al., 2016). This research included age to identify whether specific age groups were more likely to engage in risky health behaviours or respond differently to the health brief. The age distribution was positively skewed towards the youngest age category of 18-25-year-olds, $n=141$ (47.8%), which is representative of a typical Army Regiment, however, the quantitative study found no significant relationship between age and behavioural change or increased health risk-taking. This was unexpected and might be due to a strong mentorship culture in the military, where more experienced and older military personnel look after younger personnel. Military personnel also live by a hierarchical code of discipline, so more senior, older unit members tell them what to do. While plausible, these hypotheses lack direct evidence within the study. Age did not emerge as a significant factor but future research should explore how it could shape behaviour in military contexts.

Cultural norms and values related to ethnicity can shape health-related attitudes and behaviours. For example, cultural differences in perceptions of authority or adherence to health recommendations may influence how participants act on health brief advice (Betancourt et al., 2003). The ethnic background of the participants showed that 283 (95.9%) participants were categorised as 'white', which is not generalisable to the population of the British Army. Current government statistics state that 10.1% of the UK Regular Forces are from non-white ethnic backgrounds (UK Armed Forces Biannual Diversity Statistics, 2023). On investigation, it was discovered that once the quantitative study had been carried out, the Iraqi government would not issue visas to military personnel without a British Passport. The Regiments, therefore, could not deploy with personnel (mainly from our Commonwealth Nations Military personnel) without a British Passport, making the ethnic make-up non-representative. This lack of diversity limits the study's generalisability and may also have

obscured potential associations between ethnicity and health behaviours. For instance, anecdotal evidence suggests that military personnel who come from some African nations, as they are returning to their hometown, without taking precautions against Malaria due to perceived immunity. Such cultural attitudes could have influenced outcomes had the sample included a more ethnically representative cohort. If this study was repeated to specifically look at the attitudes and behaviour of the British Military's participants from non-white ethnic backgrounds, an operational tour must be chosen that does not have these administrative constraints that occlude this cohort.

64% of this cohort were in the Infantry, as expected, as the mission was to teach military infantry skills to the Iraqi Forces. The next largest group were the Royal Engineers (RE) who made up 21%. This was also expected as a form of infrastructure building and maintenance of the camps was required. The implications are that the Royal Engineer soldiers hold professional qualifications (such as chartered engineering, plumbing, electrician, etc.), so they are more used to receiving PowerPoint presentations in lecture halls than Infantry soldiers, who have more practical skills.

The participants were asked what their educational qualifications were (by level) as this can significantly impact health knowledge, or health literacy (referring to an individual's ability to obtain, process and understand basic health information needed to make appropriate health decisions) of military personnel, and has been shown to have an impact on health outcomes (National Bureau of Economic Research, 2010). Education can also influence an individual's risk perception and compliance with safety protocols. Most (39.7%) had achieved a Level 4 (GCSE) qualification. Only 4.4% had no qualifications. If a soldiers join the Army with no qualifications, they are enrolled on Level 1 & 2 Numeracy & Literacy courses which they must pass to be eligible for promotion. The 4.4% therefore must be new to the Army, still working on passing the course or have qualifications that don't equate to GCSEs. A Level 8 (Masters) qualification is offered to Officers when attending Staff Training. All personnel are entitled to army education grants throughout their career. Education levels correlate with health literacy and the ability to process and act on health-related information (Nutbeam,

2008). Education was included as a demographic variable to assess whether participants with lower qualifications were less likely to adopt health advice; however, this did not raise any significance. Although the study hypothesised that lower educational attainment might correlate with reduced adoption of health advice, no significant association emerged. This could suggest that the British military's mandatory literacy and numeracy programs or the structured delivery of health briefs standardise comprehension across education levels. However, the absence of significant findings warrants further exploration, particularly in contexts where health literacy may vary more widely.

94.6% had a Joint Medical Employment Status (JMES) of Medically Fully Deployable; the rest could deploy with limitations on their activities. The two personnel (0.7%) who answered that they were graded Medically Non Deployable (MND), may have made a mistake as this category is not allowed to deploy. This uniformity, while simplifying analysis, precludes meaningful examination of how medical limitations might influence behaviour change. Future research could benefit from exploring a cohort with a broader range of JMES fitness to assess whether health status impacts engagement with health interventions.

This was the first tour for 68.5% of participants, but it was interesting to note that no significant relationship was observed between deployment experience and behaviour change. This contradicts prior findings, such as Chern et al. (2016), highlighting higher Disease and Non-Battle Injury (DNBI) rates among inexperienced personnel during US Navy deployments. Similarly, González et al. (2017) found that younger, less experienced Columbian soldiers were less knowledgeable about sandfly avoidance, increasing leishmaniasis risk. The lack of this relationship in this study could stem from the fact that military personnel train and exercise regularly to be able to carry out their role when required, so they may have a form of de-sensitisation when they actually deploy for real, making the number of previous tours irrelevant.

In conclusion, it was highly surprising that no demographic characteristics had a significant relationship with the participant's attitudes and behaviour. The findings suggest that external factors, such as military culture, discipline, and structured training, may homogenise

responses across demographic categories. However, this conclusion requires further empirical support, as critical variables like ethnicity were constrained by sampling limitations. Explore potential confounders, such as health brief content and delivery quality, which may overshadow demographic influences. Future research could better delineate the nuanced relationships between demographic factors and health behaviour change in military contexts by addressing these gaps.

5.3.2 Theme 1: Behaviour.

This research explored the effectiveness of the health brief on influencing behaviour change among military personnel. While the health brief aimed to enhance knowledge and promote health-protective actions, findings indicate a significant gap between its intended and actual effectiveness in influencing behaviour change, which will now be discussed. Despite participants' acknowledgment of the health brief's importance, engagement and retention were inconsistent, with only 37.3% of participants reporting an actual change in behaviour. These findings align with broader research on behaviour change interventions, particularly within structured, hierarchical environments such as the military. By applying established behaviour change models such as the Health Belief Model (HBM) and COM-B framework, this discussion evaluates the underlying factors affecting behaviour change within this cohort.

Health Risk Perception of Military Personnel

The HBM (Champion & Skinner, 2008) posits that individuals adopt health behaviours when they perceive a personal risk, understand the severity of consequences, and recognise the benefits of action. This study revealed that participants responded most strongly to health messages directly relevant to their operational environment. Such as the risk of rabies, likely due to the visible presence of stray animals, reinforcing perceived susceptibility and severity. Hand hygiene behaviour improved only when environmental opportunity was present (e.g., handwashing stations in the regiment restaurant). This suggests that giving the participants

the knowledge alone in the health brief was insufficient, and that changing their behaviour depends on the physical and operational environment, allowing these actions.

Capability, Opportunity, and Motivation to Change Behaviour

The COM-B model (Michie et al., 2011) emphasises that individuals must have Capability, Opportunity, and Motivation for behaviour change to occur. The findings from this research show that (Capability) knowledge alone was insufficient to drive change. While participants reported that they understood health risks and how to protect themselves, they did not necessarily apply the guidance due to pre-existing habits or perceived irrelevance of some information.

Behavioural changes are more likely when participants had the physical and social environment to support change (Michie et al., 2011). The presence of handwashing stations in the regimental restaurant reinforced compliance, demonstrating that opportunity (not just knowledge) is critical.

The lack of engagement with specific health recommendations suggests that motivation was not effectively addressed in the brief. Military personnel are less likely to engage if they do not see immediate, personal relevance. These findings underscore that behaviour change is driven by individual drivers but also the environment and infrastructure, particularly on operations to make the changes.

The lack of reported behaviour change from the participants highlights the need for a re-examination of the health brief to ensure it informs, motivates, and empowers action. One of the most apparent insights from this research is that a one-size-fits-all approach to the health brief is ineffective. The quantitative satisfaction levels do not align with qualitative critiques, indicating that while the brief may be deemed generally helpful, it lacks specific, actionable content for different operational environments. Personnel deploying to different regions face varying health threats, yet their health briefs often cover broad, non-specific risks.

5.3.3 Theme 2 – Attitudes.

Attitudes are the evaluations and feelings individuals hold toward specific objects, issues, or people, while behaviours are the actual actions taken in response to those attitudes (Conner et al., 2021). Participants expressed mixed attitudes toward the health brief, with some appreciating its intentions, so they rated it highly, but others stated they did not change their behaviour as a result. The participants also felt the content was common sense, making them disengage with the health brief. It resonates with Pawson's (2015) argument that oversimplified interventions fail to engage participants meaningfully. Pearson and Weinstock, (2011) indicated that pre-deployment health and safety brief forms a crucial proactive measure that safeguards the well-being of military personnel and minimises health issues as did Doody et al (2021) who contend that pre-deployment health and safety brief helps to build the psychological resilience of military personnel and Hung (2008) states it maintains combat readiness and reduces stress for deployed service members. Therefore, this positive attitude from the participants who still feel as though there is a need for a health brief of some kind is encouraging.

To better understand these results, this discussion applies behavioural theories, including the Theory of Planned Behaviour (TPB) (Ajzen, 1991), Cognitive Dissonance Theory (Cooper, 2007), and Persuasion Theory (Petty & Cacioppo, 1986).

[The Relationship Between Attitudes and Behaviour](#)

The TPB posits that behaviour change is influenced by attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). While most participants believed there was a need for a health brief, qualitative responses indicated that their attitude towards it was often viewed as a "tick-box exercise" rather than a valuable learning experience.

Military personnel operate within a strongly hierarchical structure, meaning compliance with health brief attendance does not necessarily reflect a positive attitude towards it, as the focus group data revealed that many attended out of obligation rather than intrinsic motivation to change behaviour. This aligns with the quantitative finding that there was no

significant association between group delivery format and attention levels (Q14, $p = 0.253$), suggesting peer influence within large-group settings did not enhance engagement.

Cognitive Dissonance in Military Health Behaviour

Cognitive Dissonance Theory (Cooper, 2007) suggests that individuals experience psychological discomfort when their actions contradict their beliefs, and that this discomfort is typically resolved either by changing the behaviour or by reinterpreting, minimising, or dismissing the belief that conflicts with it. In this research, military culture and pre-existing beliefs clashed with some health recommendations, leading to differing attitudes towards specific advice depending on how closely that advice aligned with, or conflicted with, participants' broader sense of military identity. This tension was most clearly illustrated in relation to food safety. Participants described being advised to avoid certain local food on hygiene grounds yet also described strong cultural and operational pressure to accept it, both through direct instruction to eat with Iraqi officers as part of integration efforts, and through a more voluntary willingness to accept risk in pursuit of building rapport and demonstrating cultural respect. In the latter case, participants appeared to resolve the resulting dissonance not by declining the food, but by reframing the risk as calculated and self-managed ("you could see them making it, so you took the risk"), allowing them to accept advice-contradicting behaviour without abandoning their belief that they were acting sensibly. Where the same underlying conflict was imposed through direct order rather than personal choice, however, participants appeared to experience less need to resolve the dissonance individually, since the decision, and by extension the associated risk, had been removed by the military CoC. A related pattern was evident in relation to musculoskeletal injury, where continuing physical training despite injury reflected a broader identity-linked expectation to endure and "get on with it" rather than a deliberate weighing of costs and benefits; here, the conflict was not between two competing pieces of advice, but between health guidance and a deeply internalised occupational identity in which stopping could be read as a failure of toughness rather than a sensible precaution.

Taken together, these findings suggest that cognitive dissonance arising from health advice in a military population is unlikely to be resolved through the accuracy or repetition of the advice itself.

A related, though conceptually distinct, barrier to the sustained impact of pre-deployment health advice was cognitive load. The highly structured nature of military training means that personnel are accustomed to absorbing large volumes of information quickly; however, the sheer volume of concurrent briefings delivered during Pre-Deployment Training (PDT) appeared to result in cognitive overload, contributing to disengagement from the health brief specifically. This was reflected in the focus group data, where some participants did not recall having received a health brief at all, or required prompting to recall specific details, reinforcing the impression of limited enduring impact. Whilst cognitive dissonance and cognitive overload operate through different mechanisms, one concerning conflict between belief and behaviour, the other concerning the volume and retention of information, both point towards the same broader conclusion: that as previously discussed in the literature review chapter, the content of a health brief is only part of what determines its effectiveness.

5.3.4 Theme 3 – Delivery.

The data collected from the studies highlight several important factors influencing the effectiveness of the health information delivered to military personnel. This discussion will explore the participant's perceptions of the health brief's content, timing, delivery methods, and engagement levels, revealing key areas for improvement. While the quantitative data provided insight into general preferences of the health brief delivery, the qualitative feedback offered deeper context and understanding of the participant experiences, concerns, and suggestions.

Delivery Methods

One of the most significant findings was the widespread dissatisfaction with the lecture theatre style PowerPoint presentation format the participants were subject to for numerous concurrent presentations, not just the health brief. Participants reported that these sessions

were often monotonous, which led to a reduced attention span and poor retention of information. This aligns with previous research indicating that passive learning methods, such as lectures, are less effective in eliciting behavioural change than active learning strategies (Freeth et al., 2002; Michie et al., 2011). The participants suggested alternative methods, including scenario-based learning, smaller group discussions, and digital platforms, to enhance their engagement. Scenario-based learning has been shown to improve decision-making skills and knowledge retention by contextualising information in realistic settings (Salas et al., 2008), however, aligning some DNBI lessons with a particular scenario is challenging. Many of the hazards identified in this research, such as the proximity of Camp B to a factory, the specific arrangements for wastewater removal near accommodation, and the food hygiene practices of a facility not run by the British military, were highly specific to this deployment's particular location, climate, and infrastructure, rather than generalisable features of deployment risk more broadly. A future deployment to a different country, climate, or operational role would plausibly present an entirely different configuration of environmental and facility-related hazards; personnel deployed somewhere without an adjacent industrial site would have no meaningful use for guidance on factory-related air pollution, just as personnel deployed to a kinetic combat role would face a substantially different risk profile to the training-focused, integration-heavy deployment described by participants in this study. This creates a genuine tension for the design of future pre-deployment health briefs: whilst the underlying analytic themes identified in this research, such as the importance of source credibility, the risks of imposed versus chosen exposure, and the consequences of inconsistent CoC enforcement, may generalise usefully across deployments, the specific hazards and lessons attached to them in this study cannot be designed into a health brief for a different scenario without a fresh, location- and mission-specific risk assessment. Future health brief design may therefore benefit less from a fixed, universal checklist of DNBI hazards, and more from a structured, repeatable process for identifying and communicating scenario-specific risks ahead of each individual deployment.

Participants in this study preferred interactive formats, suggesting that incorporating role-playing exercises or case studies could improve the effectiveness of health briefs.

Surprisingly, using apps on personal devices was not a popular suggestion as previously discussed, as the participants wanted a clear line between their work and home life.

Participants' desire for a clear line between their work and home life is relevant beyond simple work-life balance; it reflects a broader pattern of identity management that has direct implications for health behaviour. Boundary theory (Ashforth, Kreiner and Fugate, 2000) distinguishes between individuals who prefer to segment their work and home identities sharply, maintaining distinct roles, behaviours and even emotional registers in each domain, and those who prefer greater integration between the two. For military personnel, this segmentation appears to serve a protective function: it allows the demands, risks and occupational identity associated with deployment to be, at least outwardly, contained within a defined domain, rather than carried continuously into home and family life. This is consistent with the broader military disposition towards stoicism and "getting on with it" discussed elsewhere in this thesis; segmentation offers a structural means of enacting that disposition, allowing personnel to compartmentalise difficult experiences rather than have them persistently intrude into civilian and family roles. However, this same segmentation carries risks for health behaviour specifically. Where health concerns are experienced as part of the "deployment" identity, a strong preference for keeping this domain separate from home life may reduce the likelihood that personnel disclose symptoms, seek support, or continue treatment once that boundary is crossed, for instance on return home or during transition to civilian life. The desire for a clear work-home boundary should not, therefore, be read only as a personal preference or coping style, but as a factor that may shape whether, when, and to whom health concerns are ultimately disclosed.

[Location-Specific and Relevant Content](#)

Participants consistently criticised the generic nature of the health brief, noting that it failed to address deployment-specific health risks. For example, malaria prevention was presented in one of the health briefs, in a region where malaria was not a concern. If military personnel do

not perceive the information as personally applicable, they are less likely to engage with it or act upon it, supporting the Health Belief Model (Champion & Skinner, 2008). These findings also align with existing literature on health intervention effectiveness, which emphasises the importance of tailoring content to the specific needs and environments of the target audience (Betancourt et al., 2003; Champion & Skinner, 2008).

The integration of real-world examples, specific environmental hazards, and culturally relevant health risks would improve the practical utility of the health brief. Participants suggested that briefings should be informed by recent deployment experiences and delivered by personnel who have firsthand knowledge of the location.

Specific questions on content of the health brief were not included in the qualitative research questionnaires, which was a notable omission. This should be including on future studies as it would strengthen the validity of conclusions drawn about the health brief's effectiveness, rather than inferring this indirectly from participants comments in the focus groups.

Timing

The timing of the health brief emerged as a crucial factor influencing its effectiveness. While quantitative data suggested general approval of a pre-deployment health brief, qualitative feedback indicated that delivering all health brief too early (weeks before the deployment) led to the participants forgetting the content. Participants expressed a strong preference for a two-stage approach: an initial brief covering general health precautions before deployment, followed by a more detailed, location-specific briefing upon arrival in theatre. This finding aligns with the work of Sniehotta et al. (2014), which suggests that interventions are more effective when delivered close to the point of need. Cognitive overload was another identified challenge, as the health brief was often part of a long series of presentations, leading to participant fatigue. This resonates with cognitive load theory (Sweller, 1988), which states that individuals can only process a limited amount of information at a time. Breaking down the health briefing into smaller, targeted sessions may alleviate this issue.

Barriers to Effective Delivery

Venue and delivery style significantly impacted participants' engagement. The participants reported that they were sat in large lecture halls, where some participants described difficulty hearing the presenter or seeing the slides, reinforcing research that suggests environmental factors play a role in the effectiveness of information delivery (Fixsen et al., 2005).

The presenter's delivery style was also a common source of dissatisfaction. Many participants described the briefing as dull and unengaging, often delivered by individuals who lacked enthusiasm or effective communication skills. They expressed a preference for delivery by medical professionals with recent deployment experience. This aligns with Michie et al. (2011), who emphasize the importance of a credible and engaging communicator in behaviour change interventions.

Herd mentality also played a role in how participants engaged with the brief. Some junior ranks chose to sit at the back of the room despite available seating at the front, likely due to social influence and the desire to conform. This highlights the need for smaller groups and interactive content where the participants feel able to ask any questions.

5.3.5 Theme 4 – Risk Taking.

The findings highlight that despite most participants stating that they knew how to protect themselves and were aware of potential health risks, a notable percentage still engaged in risky behaviour. The reasons for this can be explained by exploring the British military culture, operational demands on Op SHADER, trust in their medical support and their individual decision-making processes. Understanding these behaviours requires examining risk-taking through behavioural science frameworks, such as the Theory of Planned Behaviour (Ajzen, 1991), Sensation Seeking (Zuckerman, 2007), Risk Homeostasis (Wilde, 1982), and Dual-Process Decision Making (Evans & Stanovich, 2013), and considering past obedience experiments (Milgram, 1963).

British Military Culture.

One of the most concerning findings relating to risk-taking in this cohort is that military personnel took risks because they were ordered to do so. This reflects the rigid hierarchical

structure of the military, where following orders from the Chain of Command is integral to the functioning of the military, but also indoctrinated into individuals during training. This supports the research by Gibson (2014, p. 66), who found that obedience was deeply ingrained in military personnel. Military personnel are conditioned to prioritise completing a mission/task and obedience to their Chain of Command, rather than being concerned about a risk to themselves. The obeying of orders aligns with the experiments completed by Milgram (1963) many years ago that showed that the majority (65%) of people would carry out orders (administering an electric shock) if given by an authoritative figure. With military personnel, consideration should be given to the influence of camaraderie and loyalty, and not just carrying out orders if given by a person in authority.

The relationship between obedience and the values and standards held by the British military was particularly evident on Op SHADER, where the mission was to train the Iraqi forces. The British military personnel needed to integrate as much as possible to achieve this, which included following orders to accept the food provided by the Iraqi Forces despite the apparent health risk. In addition to strictly following orders from the Chain of Command, military personnel follow a set of values and standards. The British Army's Values and Standards, particularly the value of respect, influenced military personnel to accept food from Iraqi hosts (in the Iraqi Officers Mess and the Iraqi Engineer Camp) out of cultural sensitivity, rather than decline it based on health risks. This also aligns with Social Identity Theory (Tajfel & Turner, 1979), as personnel may prioritise team cohesion and social acceptance over personal risk avoidance.

However, there were examples where military personnel questioned the orders they were given or resisted direction when they perceived the risk as extreme. For example, a participant expressed concern over using utensils, which they claimed had been licked by an Iraqi soldier first. This resistance aligns with findings from Bartone et al., (2002) that "under extreme risk, personnel may resist orders they perceive as unnecessarily dangerous". The military person expressed concern to his Sergeant, demonstrating he perceived the severity of the risk (Ajzen, 1991) and showed he had confidence in his leadership to address such

concerns. This highlights an important nuance as it counters the assumption that military personnel always obey orders. If they did, this would ensure an increase in the success of compliance to recommended health advice and a reduction in risk-taking activities.

Operational Demands on Op SHADER.

The participants felt that some risks were taken due to necessity, i.e. operational constraints rather than choice. Military personnel ate falafels, for example, because it was the only food available at the time, when they had started the day at 0530 and were hungry. Similarly, some military personnel had to eat in the Iraqi Engineer Officers Mess every Wednesday due to their instructing schedule with the Iraqi Forces.

There were also environmental health risks, which were beyond the control of the participants, such as the stagnant water and wastewater trucks in camp, burning waste, electrical safety in buildings and the management of outbreaks such as Diarrhoea and Vomiting (which varied by camp, some implemented quarantine areas, while others did not). These examples highlight that participants could not always control some of the risks they faced and were often considered unavoidable aspects of the job.

These risks need higher-level intervention and policy enforcement, rather than being a responsibility of the individual.

Trust in Medical Support

There was a strong preference for the Regimental Medical Officer (RMO) or unit medic to deliver the health brief. Military personnel trusted their medical chain on this tour, and this trust directly influenced risk-related behaviours. It was reported that the RMO and their team continued to provide Force Health Protection advice to reduce DNBI risk throughout the tour, cementing that trust and reinforcing the risk reduction message, which was well received. This supports the Self-Determination Theory (Deci & Ryan, 1985), which suggests trust and relatedness enhance motivation. When the military personnel had a good relationship with the RMO, they were likelier to internalise the message and act accordingly (Deci & Ryan, 1985).

Individual Decision-Making Processes

When military personnel took their own risk-taking decisions, the participants stated that they did not mindlessly take risks; instead, they conducted their own informal risk assessments. Some justified eating local food because they could see it being prepared, believing this made it safe. This is an example of Cognitive Dissonance (Festinger, 1957) as the military personnel were aware of the risk of eating local food but justified their risk-taking behaviour (to reduce dissonance) by minimising the risk as they could see it being made. According to the Health Belief Model (Rosenstock, 1974), individuals must perceive the severity of the risk, their susceptibility, the benefits of action, and the barriers to action not to take the risk. In this case, the military personnel thought the risk was worth the benefit. They also reported that none of their peers had been ill after eating at the falafel place, so they did not perceive it as a risk. This aligns with the risk homeostasis theory (Wilde, 1982), which explains that the participants' perceived level of risk decreased as they or their peers had no immediate effects. Hence, they “recalibrated their risk threshold” and felt justified repeatedly eating the food (Wilde, 1982).

Beyond situational factors, individual personality traits may also be responsible for risk-taking, particularly individuals with high sensation seeking tendencies (Zuckerman, 2007). Military personnel may be more inclined to take risks due to their high sensation-seeking tendencies, seeking out stimulating and new experiences. Some military personnel expressed a higher threshold for perceived danger, as they were more willing to take risks because they assess the likelihood of negative consequences as low or manageable (Wilde, 1982).

[DNBI When Health Advice Is Adhered Too.](#)

Assuming that DNBI primarily results from risk-taking behaviour is common in military health, but it becomes problematic when considered alongside evidence that injury can occur even when personnel adhere to health advice. This has important implications for how health attitudes and behaviours are formed, maintained, and interpreted within military populations. DNBI is often framed within a behavioural lens that emphasises individual responsibility, implying that injury risk is largely a function of poor compliance with preventive guidance.

This aligns with traditional health behaviour models that link outcomes to individual choices and perceived controllability (e.g., the Theory of Planned Behaviour). However, this framing is increasingly challenged by evidence that many occupational injuries occur despite adherence to safety guidance, due to systemic, environmental, and operational constraints rather than individual decision-making alone (Knapik et al., 2007; Jones et al., 2017).

Within military contexts, exposure to unavoidable physical demands (load carriage, terrain, sleep deprivation, environmental extremes, and operational tempo) means that personnel may experience injury even when fully compliant with preventive advice. Studies of military training and operational populations consistently show that musculoskeletal injuries arise from cumulative load, fatigue, and environmental stressors that are only partially modifiable through behavioural change interventions (Hodgson et al., 2015; Bullock et al., 2010). This creates a critical tension: health advice may be followed correctly, yet adverse outcomes still occur.

When individuals experience poor outcomes despite adherence, this can significantly undermine health-related cognitions, particularly perceptions of control, trust, and response efficacy. From a behavioural science perspective, this directly affects constructs within the COM-B model, especially: Psychological capability (belief in understanding what works), Reflective motivation (belief that actions lead to outcomes) and Belief about consequences (within the Theoretical Domains Framework).

Repeated experiences of injury despite compliance may generate a form of learned helplessness or fatalism, where personnel perceive health outcomes as largely independent of their behaviour. This can reduce future engagement with preventive measures, not because of disengagement, but because of perceived ineffectiveness of the intervention itself (Bandura, 1997; Schwarzer, 2008). In military settings, this is particularly important because health messaging often implicitly links compliance with personal responsibility. When outcomes contradict this narrative, it can erode credibility of health briefs and reduce trust in institutional guidance, even when advice is evidence-based.

Behaviourally, the disconnect between compliance and outcome may produce two divergent responses: Reduced adherence (reactive disengagement), where military personnel may deprioritise future health guidance if it is perceived as ineffective, particularly under operational pressure where competing demands are high, and over-reliance on resilience narratives. Alternatively, military personnel may normalise injury as inevitable, reinforcing a “just push through” culture that prioritises operational effectiveness over prevention. This aligns with findings that military cultures often valorise endurance and risk acceptance, sometimes at the expense of long-term health outcomes (Greenberg et al., 2012). Both responses highlight a key issue: behaviour is not solely shaped by knowledge or intention, but by the perceived relationship between action and outcome.

This critique suggests that attributing DNBI primarily to risk-taking behaviour risks oversimplifying causation and reinforcing individualised blame narratives. A purely behavioural framing may obscure structural determinants such as training load, equipment design, staffing, and environmental exposure. A better interpretation positions DNBI within a systems-informed health model, where injury risk is co-produced by individual behaviour and operational context. This aligns with contemporary occupational health approaches that emphasise shared responsibility between individual, unit, and organisational systems (Green & Collingwood, 2018).

5.3.6 Theme 5 – DNBI

DNBI remains a significant challenge for military personnel on deployment, affecting operational effectiveness and individual health. It was crucial to identify participant reported prevalence, causes, and perceptions around DNBI on this deployment to improve DNBI prevention efforts. There was particular focus on the top three DNBI suffered which were gastrointestinal illness, musculoskeletal injuries and respiratory conditions. The environmental health hazards and the effectiveness of medical support were also key factors and will also be discussed. The findings show that some DNBI, particularly D&V, were widely acknowledged as expected, suggesting an acceptance of certain health risks as inevitable.

Additionally, the effectiveness of PDT health briefs and the variability in medical support raised questions about the effectiveness and adequacy of Force Health Protection measures prior to a deployment, and treatment consistency.

The Prevalence and Perception of DNBI

A key finding from the study is the contrast between the perceived and participant reported prevalence of DNBI. While participants in the focus groups initially downplayed the amount of military personnel that they thought suffered from DNBI, further probing revealed a pattern of persistent D&V, particularly in specific locations such as Camp B. This contradiction between low participant reported DNBI rates and widespread acceptance of gastrointestinal issues highlights a cultural normalisation of illness on operational tours within the military. This aligns with previous literature mentioned indicating that DNBI is often underreported or dismissed as a routine part of deployment (Murray & Yun, 2016). Murray & Yun (2016) found that military personnel frequently normalise gastrointestinal disease rather than seek treatment, leading to prolonged symptoms and further spread. Furthermore, military personnel could be reluctant to report that they were ill due to a fear of appearing weak and assuming that they just had to 'get on with it'. Participants who suffered with D&V also think that their chain of command or regiment would be berated in some way due to one of their military personnel succumbing to DNBI. Bartone et al. (2002) highlighted that individuals in elite military units were especially reluctant to report health issues, fearing it could impact their status or unit cohesion.

Gastrointestinal Illness and Food Hygiene

Gastrointestinal illnesses were the most commonly discussed DNBI in the focus groups, with participants linking D&V cases to poor food hygiene, unsanitary conditions, and exposure to contaminated food. A key challenge in Camp B was the lack of control over hygiene standards, as the facility was not operated by the British military. Personnel had no oversight over kitchen equipment maintenance or food preparation quality, which may have contributed towards gastrointestinal illness.

Additionally, some personnel engaged in risk-based decision-making regarding local food consumption as previously discussed. It was reported that the participant or their peers had previously consumed local food without falling ill at this local establishment. This implies that this particular shop has better food hygiene standards.

Environmental Hazards and Air Pollution

Aside from food-related illnesses, participants frequently raised concerns about air pollution and environmental health risks. Military personnel stationed in Camp B and Camp T specifically noted exposure to airborne pollutants, industrial emissions, and stagnant wastewater, which they believed contributed to their respiratory illnesses and other DNBI. Protective measures such as face masks were seen as insufficient, further exacerbating the issue. This finding highlights a gap between the anticipated and actual environmental risks on deployment. While the health brief focused heavily on vector-borne diseases like malaria which is not present in Iraq, there was however significant exposure to air pollution, indicating a misalignment between the health training and actual risks.

Musculoskeletal Injuries and Physical Training Risks

Unlike gastrointestinal and environmental health concerns, musculoskeletal injuries were less frequently discussed in the focus groups but the highest incident of DNBI category in the quantitative study. These injuries primarily resulted from physical training and sporting activities rather than combat or operational duties. This finding underscores the cultural expectation of resilience in the military, which may contribute to injury exacerbation due to reluctance to report or modify physical activity. Notably, participants did not recall musculoskeletal injuries prevention strategies being covered in the health brief, suggesting this was a key opportunity to improve the health brief missed.

Medical Support and DNBI Management

Opinions on medical support were mixed, with some personnel praising medical teams for their proactive approach to Force Health Protection, while others reported frustration with their treatment. The inconsistency in medical support was further evident in how D&V

outbreaks were managed across different camps. In Camp T, personnel were quarantined, whereas in other locations, no containment measures were implemented.

This suggests that policy enforcement varied by location, raising concerns about standardisation of DNBI management protocols. Ultimately, DNBI prevention requires a multi-faceted approach that considers both medical guidance and the realities of military decision-making in operational environments.

Beyond raising concerns about the standardisation of DNBI management protocols, this inconsistency is likely to carry an implicit message to personnel about how seriously D&V risk is actually treated by the institution responsible for managing it. Where isolation was visibly enforced in one location but absent in another, personnel had direct evidence that the rule was discretionary rather than a fixed, universally applied standard, regardless of what pre-deployment guidance may have stated. This pattern is consistent with Vaughan's (1996) concept of the normalisation of deviance, in which a gap between formal protocol and actual, repeated practice gradually comes to be seen not as a violation to be corrected, but as the accepted local norm, particularly where the deviation has not visibly resulted in serious harm. Applied to this context, personnel who observed or experienced D&V outbreaks proceeding without containment, without evident negative consequence for those responsible, may reasonably have concluded that the absence of isolation was an acceptable, low-risk departure from protocol rather than a dangerous lapse, weakening the perceived necessity of the measure itself. This has plausible implications beyond D&V management specifically: if personnel observe that one health protocol is inconsistently enforced without consequence, this may generalise into a broader scepticism about the seriousness or consistency of health-related guidance more widely, including the pre-deployment health brief, reinforcing the credibility concerns identified elsewhere in this theme. In this sense, inconsistent CoC practice may not simply fail to reinforce health-protective behaviour; it may actively teach personnel that guidance in this domain is negotiable, with consequences for engagement with health advice that extend well beyond the specific inconsistency observed.

5.4 Theoretical Implications.

The findings of the quantitative and qualitative studies have a number of theoretical implications which align with established behavioural science frameworks including the COM-B Model of the Behavioural Change Wheel, Health Belief Model (HBM), Social Cognitive Theory (SCT), Dual-Process Models and Transtheoretical Model (TTM). It also has theoretical implications involving the specific cultural and operational influences which are special to this cohort and this environment. The theories and models mentioned were introduced previously in the Literature Review Chapter 2, now this section will provide the linkage of theories to the findings from the studies.

COM-B posits that behaviour change occurs when individuals have the capability, opportunity, and motivation to adopt new behaviours (Michie et al., 2011).

Capability: Participants with lower educational backgrounds or first-time deployers reportedly struggled with understanding and applying health advice, suggesting gaps in psychological or physical capability.

Opportunity: There were opportunities to take known risks and eat the local food, which was highly attractive when military personnel had been on long patrols without hot food. Equally there was not the opportunity to follow feeding advice in some cases.

Motivation: Peer influence and operational demands impacted participants' intrinsic and extrinsic motivation to adhere to health advice.

The implications of this are that the health brief should address all components of the COM-B model by enhancing comprehension, providing practical resources, and fostering a supportive cultural environment. The Recommendations Chapter 5 gives populated worksheet which demonstrate how COM-B can be used for the health brief.

The Health Belief Model (HBM) suggests that behaviour change depends on perceived susceptibility, severity, benefits, and barriers, as well as cues to action (Rosenstock, 1974).

Perceived Susceptibility and Severity: While illness was acknowledged as a risk, the perceived inevitability of getting sick reduced adherence to preventive measures.

Perceived Benefits and Barriers: Participants saw value in the health brief advice but cited barriers such as resource limitations and irrelevant content.

Cues to Action: The brief itself acted as a cue, but its effectiveness was undermined by poor delivery methods.

To improve behaviour change, the health brief should emphasise susceptibility and severity through real-world examples, highlight tangible benefits, and address perceived barriers with practical solutions.

Social Cognitive Theory (SCT) emphasises the role of observational learning, self-efficacy, and environmental influences in behaviour change (Bandura, 1986).

Observational Learning: Peer influence emerged as a significant factor in both adherence and risk-taking behaviours, aligning with SCT's focus on modelling behaviours.

Self-Efficacy: Participants' confidence in applying health advice was undermined by situational challenges, suggesting a need for strategies to build self-efficacy.

Environmental Factors: Resource constraints and deployment conditions acted as barriers, consistent with SCT's emphasis on environmental determinants.

Incorporating presentations or comments from a military peer(s) who have previously deployed to Iraq and adding practical demonstrations into the health brief could enhance observational learning and self-efficacy.

Dual-process models suggest that behaviour change is influenced by both automatic (intuitive) and reflective (deliberative) processes (Kahneman, 2011; Strack & Deutsch, 2004).

Automatic processes: Operational demands led to intuitive, risk-based decisions (e.g., consuming unsafe food due to necessity).

Reflective processes: The health brief aimed to engage reflective thinking, but its monotone delivery reduced its impact on deliberate behaviour change.

The health brief delivery should try to include intuitive processes through moulages and visual aids while supporting reflective processes with clear, actionable steps.

The Transtheoretical Model TTM describes behaviour change as a progression through stages: pre-contemplation, contemplation, preparation, action, and maintenance (Prochaska & DiClemente, 1983). Many participants remained in the contemplation stage, recognising the importance of health advice but not fully adopting it. A significant drop-off occurred in the maintenance stage, as operational realities undermined sustained adherence. The health brief should incorporate strategies to move individuals from contemplation to preparation and action, with follow-up interventions to support maintenance.

The findings in this thesis highlight the importance of cultural and contextual factors, which were not always addressed in the previous traditional behaviour change theories. Military culture normalises risk-taking behaviours, which can counteract health advice. Operational realities create barriers that many behaviour change theories assume can be mitigated. Integrating cultural and contextual considerations into existing frameworks can make them more applicable to this military setting.

5.5 Impact of thesis.

The information from this thesis will also be able to provide the Defence Medical Services with underpinning evidence to base other health interventions for this cohort. The author will volunteer to present the recommendations at the Force Health Protection (FHP) Working Group meetings and to members of the Defence Public Health Unit amongst other health promotion and education professionals as required.

As mentioned previously, I believe that this research has a wider application to other populations.

5.6 Limitations of the Study

The methodology used for this thesis was MMR which provided the opportunity to collect quantitative and qualitative data then triangulate enabling deeper understanding that might not have been achievable using another approach.

There were however some issues such as the questionnaire design which included categorise with small numbers of responses. This caused an issue with the statistics tests, so Fishers exact had to be used for some data. The questions also gave an option of 'yes,

no, not sure' but when the logistical regression model called for binary data. The author considered what was most relevant to understand, who was sure that the health brief had been a reason that they changed their behaviour. Therefore, 'Yes' was left to stand alone and 'No' and 'not sure' were combined.

The sample used for data collection consisted of mainly males which although it is generalisable to the military and the infantry in particular who carry out this type of operational tour, but future studies would benefit from and investigating further the attitudes and behaviour of females. A female military health study has recently been published so this is an area of expanding research that could evolve into behavioural change. Gender differences in health behaviour within military populations are not consistent and appear to narrow considerably compared with civilian populations. A Norwegian cross-sectional study comparing 1,068 active-duty military women with 8,100 active-duty military men found no significant difference in high alcohol consumption between the sexes, and reported that military women smoked less often than military men but used smokeless tobacco more, whilst also reporting greater use of pain-relieving and psychotropic medication, and more musculoskeletal pain in the 40-60 age group specifically (Fit for Fight, (2019)

Notably, many of these differences narrowed or disappeared entirely in older age brackets, suggesting that age, rather than gender alone, moderates' health behaviour within this population. This pattern of convergence between military men and women is consistent with research conducted among Australian Army personnel, which similarly found no significant association between gender and either smoking or risky alcohol consumption, in contrast to general population trends in which these behaviours are typically more prevalent among men. The authors of that study proposed that this convergence may reflect the influence of military culture itself, whereby female personnel serving within a male-dominated environment adopt behaviours similar to their male counterparts as a means of social conformity and acceptance. Taken together, these findings suggest that gender differences in health behaviour observed in civilian populations do not straightforwardly transfer to

military populations, and that occupational and cultural factors specific to military service may exert a stronger influence on health behaviour than gender itself.

This thesis would also benefit from having a more diverse ethnic background of participants.

The limitation with this study is the majority of the participants were white and this was due to a visa restriction going into Iraq the restriction on the visas ensured only British personnel could get a visa so those members of the military who were recruited from overseas (such as the Commonwealth) did not get a visa and therefore could not deploy.

5.7 Future Research Directions

The gaps identified in this field of study involve the impact of behaviours science compared to research on the prevalence of disease. This would lead to more effective and targeted interventions and therefore reduced DNBI rates.

Many studies are of just of males in the military so there needs to be more research on different genders.

The author will also explore novel approaches to military health interventions going forward. These could include utilising the advancement in technology such as Extended Reality (XR), simulation suites and Virtual Reality (VR) with headsets and would provide an interesting and exciting way of delivering health information to Military personnel. These research ideas need designing and testing but contemplating the higher philosophical questions about how knowledge is constructed and communicated, increasing the wider impact this could have not only for military personnel.

Emerging technologies.

Apps are seen as effective as they are easily accessible but the use of professional support service is encouraged. The issue with this is that Military personnel don't want to use the mobile phones for "work stuff" so we need to change messaging (COM-B) to something that makes them think they are helping themselves prepare for operations rather than it being an order. Apps can provide population specific tools or information and the environment and country specific information. It's cost effective when funding, time and manpower are tight.

There are DLODS required especially training for healthcare professionals and patients to use the app. The type of app is important as is it resilience versus a well-being app

Future Projects

Interventions that would benefit from further study and the application of COM-B in addition to the PDT health brief and AVP uptake are discussed below:

In addition to vaccination compliance, another area of Force Health Protection (FHP) and pre deployment preparation to address DNBI rates on operational tours relates to the taking of Malaria prophylaxis. Studies have shown that compliance to taking malaria prophylaxis in the form of Doxycycline tablets is poor due to previous side effects. There is also a trend for non-UK nationals refraining from taking malaria prophylaxis if they think they are just returning “home” and so are not susceptible to Malaria as they are native to that country (applied particularly to Military personnel from the commonwealth countries). To address this issue, a mixed methods research project will commence in Jan 2025, aiming to identify the barriers to malaria prophylaxis non-compliance. Once the barriers have been identified from the sample population who will deploy to Kenya and Sierra Leon, the COM-B model will be applied and the recommendations from this proposed to the Defence Medical Services Chain of Command.

Another project which is at the research proposal and literature review stage is concerned with the psychological preparedness following a Chemical, Biological, Radiological and Nuclear incident. This study will be slightly different in the fact that a health intervention issue has not been identified but rather COM-B will be used to design training to ensure preparedness. The COM-B tool will make sure all areas (Capability, Opportunity and Motivational) have been included.

5.8 Reflexivity.

I have chosen to include a reflexivity section in this thesis as it is important for several reasons such as ensuring academic standards but also enhancing the transparency and credibility of this research (Lincoln and Guba, 1985). Reflexivity ensures rigor in qualitative research, as discussed by Finlay (2002), who argued that critically engaging with one's

biases enhances analytical depth and it also acknowledges the 'co-construction of knowledge' (Guba and Lincoln, 1994). I have therefore provided areas of reflexive thoughts where I examined my own role, biases, and influence on this research.

As a British Army Officer who has completed several operational tours, this professional background provided valuable contextual insight but also risked assumptions about participants' prior knowledge. I remained conscious of this by adopting an open-ended questioning approach during focus groups to allow participants to express their own perspectives.

Given my trade as a medical professional and wearing the insignia of the Royal Army Medical Corps (RAMC) on my uniform, I believed that some participants may have been cautious in negatively critiquing the health brief as it was delivered by an Environmental Health Practitioner who was also RAMC. To mitigate this, I emphasised their anonymity and my impartiality to encouraged open discussion, particularly in the focus groups to make participants feel more at ease.

Initially, I planned to conduct both studies in the various camps around Iraq but security and logistical constraints necessitated a move of location to the staging post in Akrotiri. I felt as though this could have limited the recollection of the participants once they were taken away from the environment in Iraq, but it enabled me to gain the data from the whole cohort regardless of which camp they had been stationed in. This would have created different dimensions to the study if the participant selection was by camp location rather than as a whole cohort.

Discussing risk-taking behaviours required careful handling to ensure participants felt comfortable sharing their experiences without fear of judgment. I reassured them that responses would remain anonymous and framed questions to encourage reflection rather than self-criticism but did feel as though the participants were truthful with their comments.

CHAPTER 6 - RECOMMENDATIONS

6.1 Recommendations

In order for health interventions such as the health brief to result in behaviour changes which promote good health practices, the following is recommended:

Behaviour Change

1. Make the Health Brief specific to the theatre: The mismatch between quantitative satisfaction with the health brief and qualitative critiques of the content suggests a need for health briefs that contain useful and specific information that align with the theatre the Military personnel are to deploy to. Equally subjects that are not relevant to a theatre should be removed from the brief.

2. Address Environmental and Cultural Barriers: Camp B was reportedly the source of DNBI outbreaks so external factors such as camp hygiene and food handling should be addressed. It is suggested that where possible, no UK Military personnel are stationed at a camp that is not run by the UK or that UK health professionals (such as EHP's) can inspect. Portable hygiene kits or infrastructure improvements should also be investigated to mitigate these environmental hazards. Ultimately military personnel may wonder why they should take health risks seriously if the chain of command put them in situations where there are environmental health risks outside of their control.

Cultural practices should be learnt prior to deployment with a Force Health Protection angle to every presentation which provides insights on what to do in situation that interact with the local population (such as ensuring the food is from a hot source).

3. Incorporate Behavioural Science: Military health interventions should be underpinned by health theories and behavioural science tools to assure they achieve their intended outcomes. The Capability, Opportunity, Motivation- Behaviour (COM-B) model as part of the Behaviour Change Wheel (BCW) which was presented in Chapter 2 – literature review, is strongly recommended. To demonstrate, in practical terms, how the theoretical framework introduced in Chapter 2 could be operationalised to improve the current pre-deployment health brief, the Behaviour Change Wheel and its associated COM-B model (Michie, Atkins and West, 2014) were applied to a specific behaviour identified within the findings of this thesis: personnel continuing physical training whilst injured, rather than ceasing activity and

reporting the injury promptly. This behaviour was selected as it was directly attributable to individual action, rather than to facility or CoC failure, and was explicitly linked in the data to an identifiable gap in existing pre-deployment content. Working through the eight-step process set out by Michie, Atkins and West (2014, pp. 240), this behaviour was defined, specified, and diagnosed against the six components of the COM-B model, revealing deficits primarily in psychological capability (a lack of specific guidance on injury management), social opportunity (a peer culture that did not discourage continuing to train through injury), and reflective motivation (a belief that continuing reflected toughness rather than risk). These deficits were then used, applying the APEASE criteria, to identify appropriate intervention functions, policy categories, and behaviour change techniques, resulting in a proposed blended intervention combining face-to-face delivery by a credible messenger, a portable quick-reference resource, and reinforcement through a peer system, in preference to passive or purely digital modes of delivery. The full worked example, including all eight completed worksheets, is presented in Appendix L. Whilst this example addresses a single, specific behaviour rather than the pre-deployment brief in its entirety, it illustrates a replicable, evidence-based process by which the theoretical recommendations of this thesis could be translated into concrete, actionable improvements to future health brief design.

Attitudes

4. **Incorporating behavioural nudges** (Thaler & Sunstein, 2008): Short reinforcement sessions in-theatre could mitigate information overload and reinforce key messages at critical points of deployment.
5. **Evidence based anecdotes**: To build up trust and credibility with Military personnel, personal anecdotes or case studies from someone who had recently deployed to the same region, would make the advice feel more actionable and relatable. This obviously may not be possible in all cases however.
6. **Support Military personnel on their first deployment**: Additional resources should be

provided (or follow-up sessions) for those who are deploying for the first time as they may feel overwhelmed by the volume of information in the health brief if they have not heard it before.

Delivery

7. **Streamline the health brief:** The health brief should be focused on the most critical health risks for the specific deployment, reducing time spent on irrelevant topics.
8. **Adopt Interactive Formats:** There were suggestions from the focus groups about apps, interactive materials, and visual aids aligned with modern approaches to behaviour change. Virtual Reality, mixed reality or augmented reality scenarios would work particularly well set between other 'lecture style' presentations to keep participants interested. Interactive or gamified elements added to the health brief may also capture the interest of younger soldiers. Incorporating these tools could enhance long-term adherence as they will be more memorable.

Risk taking.

9. **Operational Realities:** It is recommended that the health brief is modified to reflect the realities of operational settings, including the inevitability of some risk-taking due to cultural sensitivities. This will enhance the health briefs' credibility and practical relevance.
10. **Incorporate Peer Influence Strategies:** Highlighting positive peer examples in the health brief to create a culture of adherence to health advice would counteract the normalisation of risky behaviours.
11. **Emphasise Consequences:** It is recommended that real-world case studies of health outcomes resulting from risk-taking are included in the brief to make it more compelling and memorable.
12. **Provide Tools for Mitigation:** Equip Military personnel with portable hygiene kits, reusable utensils or other resources to reduce barriers to following health advice in austere environments.

Reducing DNBI

13. Enhance the Practicality of the Advice: The health brief should be tailored to reflect the realities of deployment conditions, offering practical, actionable strategies that can be implemented in resource-limited environments.

14. Improve the Infrastructure: Provide resources such as hand sanitisers, pest control and safe food storage options to mitigate the environmental barriers identified in qualitative feedback.

16. Continuation of Military Health Surveillance: NATO health surveillance should continue but there must be more analysis of trends and highlighting of FHP issues. A link to the health brief (via the delivery teams) is vital to refine future health brief content to address emerging trends.

General

17. Address Minority Cohort Health Concerns: Include content relevant to female or ethnic minorities who are Military personnel to ensure inclusivity and improve engagement with minority cohorts.

6.2 Future Research

Continued future research is needed in the field of behavioural science with this particular cohort. The health interventions that are currently taking place will require evaluating and possibly updating. This could be done using the MRC guidance on evaluating complex interventions. The MRC guidance covers development, feasibility and piloting, evaluation and implementation of a project for those health interventions that already used in the military. The COM-B behavioural science tool should be used to enable it to be pitched at the right level.

As technology advances the use of XR including augmented reality, virtual reality and mixed reality could be used for training. This could see an environment replicated that looks exactly like the theatre that the Military personnel will be deploying to which would provide realism. Other advances in technology could also be considered such as using Apple watches that could collect health data. These data can be extracted and analysed so therefore patient reported DNBI can be collected rather than using EPI NATO which is only available if the

patient present at a medical facility on operations. The problem with the Apple Watch currently is the security aspect as if a service person is wearing an Apple Watch they can be located and this would immediately identify their location to the enemy. These data could be collected in an exercise scenario however and could be used to estimate casualty numbers. There is also a need to evaluate the health brief using an evaluation tool to identify what needs to change.

6.3 Dissemination of findings

Sharing the findings from this research is a critical step to ensure its practical value is recognised and applied. The dissemination plan is designed to reach key audiences, from military and public health practitioners to international partners, fostering collaboration and driving improvements in health interventions.

Continuing Research

The insights from this research will act as a springboard for future studies, particularly in refining and tailoring health intervention frameworks for military contexts. Ongoing collaboration with Defence Public Health Unit personnel and other stakeholders will ensure the research evolves to address emerging challenges effectively.

Presentations to Key Audiences

Tri-Service Environmental Health (EH) Conference on 15 Nov 2024. This conference brought together military environmental health professionals from across the services. Presenting here provides an excellent opportunity to share the findings with those directly involved in the PDT health briefs. The focus was on practical recommendations to reduce Disease Non-Battle Injury (DNBI) rates and improve the relevance of health interventions. Defence Primary Healthcare (DPHC) Public Health Practitioners. Presenting to DPHC practitioners is vital for ensuring that the findings are translated into practical, day-to-day interventions. The presentation will emphasise actionable steps to make health briefs more engaging and specific to deployment contexts, empowering healthcare professionals to better prepare military personnel.

Joint Medical Capability Team, SO1 CBRN, and Force Health Protection (FHP). This audience includes senior decision-makers responsible for Chemical, Biological, Radiological, and Nuclear (CBRN) defence and overall Force Health Protection strategies. The findings will highlight how behavioural insights can be integrated into health interventions, improving their effectiveness in both routine deployments and high-risk environments.

Dstl Anthrax Team. By collaborating with the Defence Science and Technology Laboratory (Dstl) Anthrax Team, the findings can be applied to address specific biological risks. The presentation will focus on tailoring health messaging and strategies to improve compliance with protective measures during biological incidents.

NATO Presentation. Sharing these findings with NATO partners provided a platform to showcase their relevance on a global scale. This presentation will emphasise how behavioural science can enhance health interventions across allied forces, fostering collaboration and learning from diverse military contexts.

[Making an Impact](#)

By engaging with these key audiences, the aim is to: Improve the delivery and impact of pre-deployment health interventions, influence policy and training programs to better support military personnel, contribute to the broader understanding of health behaviour and intervention design, particularly in high-risk and military environments.

This dissemination plan ensures that the findings not only inform academic discussions but also translate into meaningful changes that enhance the health and well-being of military personnel and their operational readiness.

6.3 Practical Implications

The results of this thesis have already been applied in practice. There are a number of health interventions in the military as discussed in Chapter 2 Literature Review with differing success. As recommended in Chapter 6 Recommendations, there should be a template to follow that includes the health theories and use an underpinning health model such as COM-B.

An example of where this has already been employed by the author is Anthrax Vaccine Uptake intervention. Anthrax Vaccine Precipitate (AVP) is offered to all military personnel prior to them deploying and those in the “at risk” occupationally such as Environmental Health Officers and Explosive and Ordnance Disposal specialists. There has been an issue with low uptake of AVP in the British Military for over 20 years, so the author implemented a health improvement plan based using the COM-B Behavioural Science tool (Michie, 2016). An initial qualitative study was carried out by the Behavioural Science team in Defence Science and Technology Laboratory (Dstl) (DSTL Report, 2023) interviewing a number of Military personnel (medical staff and patients/ Military personnel). The Dstl report made the following findings based on the COM-B model:

Interventions that would benefit from further study and the application of COM-B in addition to the PDT health brief and AVP uptake are discussed below:

In addition to vaccination compliance, another area of Force Health Protection (FHP) and pre deployment preparation to address DNBI rates on operational tours relates to the taking of Malaria prophylaxis. Studies have shown that compliance to taking malaria prophylaxis in the form of Doxycycline tablets is poor due to previous side effects. There is also a trend for non-UK nationals refraining from taking malaria prophylaxis if they think they are just returning “home” and so are not susceptible to Malaria as they are native to that country (applied particularly to Military personnel from the commonwealth countries). To address this issue, a mixed methods research project will commence in Jan 2025, aiming to identify the barriers to malaria prophylaxis non-compliance. Once the barriers have been identified from the sample population who will deploy to Kenya? Sierra Leon, the COM-B model will be applied and the recommendations from this proposed to the Defence Medical Services Chain of Command.

Another project which is at the research proposal and literature review stage is concerned with the psychological preparedness following a Chemical, Biological, Radiological and Nuclear incident. This study will be slightly different in the fact that a health intervention issue

has not been identified but rather COM-B will be used to design training to ensure preparedness. The COM-B tool will make sure all areas (Capability, Opportunity and Motivational) have been included.

6.4 Implementation of thesis recommendations

In order for this thesis to make an impact on the PDT health preparations and other health interventions in the military, there must be a plan to implement the recommendations. The plan will be discussed and circulated amongst the Defence Public Health hierarchy, and a timeline to implement the recommendations accepted by them drawn up. The implementation suggestions are presented below:

[Tailoring the Health Brief to Deployment Theatres](#)

To ensure that health briefs are relevant and effective, they will be customised to match the specific environmental and operational conditions of the deployment theatre. This will involve: Conducting health intelligence research and reconnaissance (recce) assessments to identify region-specific health risks. This can be done by searching for health information via the World Health Organisation and Non-Governmental Organisation databases and other tools. A recce can be carried out in person by an advanced party of military personnel or information gathered from coalition or host nation forces and allies. Equally, collecting data such as 'lessons learnt' from deployed personnel to gather feedback on the effectiveness of past health briefs and refining content accordingly should be carried out.

With this information, any non-relevant content would be removed from the health brief.

[Addressing Environmental and Cultural Barriers](#)

To reduce Disease and Non-Battle Injury (DNBI) risks, interventions will include conducting environmental health risk assessments of military camps before deployment. Ensuring UK personnel are stationed in camps with adequate hygiene standards or under UK health professional oversight. Introducing portable hygiene kits and infrastructure improvements (e.g., enhanced waste disposal and water purification systems). Embedding cultural competency training within Force Health Protection (FHP) briefings to help personnel navigate food safety and hygiene practices when interacting with local populations.

Applying Behavioural Science Principles

To enhance the effectiveness of the health brief, interventions will be guided by behavioural science frameworks such as the COM-B model. Implementation steps include: Developing pre-deployment health brief interventions using the eight worksheets from Michie, Atkins, & West (2014). Training health educators on behavioural science techniques to improve message retention and engagement. Evaluating health interventions through behavioural outcome metrics post-deployment.

Enhancing Attitudes Through Nudging and Evidence-Based Communication

To ensure Military personnel engage with and trust health advice, short reinforcement sessions will be conducted in-theatre to prevent information overload and reinforce key messages. Personal anecdotes and case studies from personnel recently deployed to the same region will be incorporated where possible. Additional resources and follow-up sessions will be provided to support those on their first deployment, helping them process health brief content more effectively.

Improving Health Brief Delivery

To optimise engagement, the health brief will be streamlined and modernised. The briefing will focus on the most critical health risks relevant to the deployment. Digital and interactive formats such as Virtual Reality (VR), Augmented Reality (AR), and gamified content will be introduced to increase retention and engagement. Visual aids and mobile applications will be integrated into pre-deployment training materials.

Mitigating Risk-Taking Behaviours

To address risk-taking tendencies among personnel, the health brief will include realistic scenarios that acknowledge the operational realities and cultural sensitivities associated with deployment. Peer influence strategies will be incorporated to reinforce positive health behaviours. Case studies of real-world health consequences due to risk-taking will be included to make the briefing more compelling.

Reducing Disease and Non-Battle Injury (DNBI)

To improve the effectiveness of DNBI prevention, the health brief will provide practical, actionable strategies suited to resource-limited conditions. Infrastructure improvements, such as pest control, hand sanitizers, and safe food storage options, will be introduced to reduce environmental health risks. NATO health surveillance data will be continuously monitored and analysed to refine future health brief content, ensuring alignment with emerging trends.

Ensuring Inclusivity in Health Interventions

To enhance engagement among minority cohorts the content addressing the specific health concerns of female and ethnic minority Military personnel (where required) will be incorporated into health briefs. Minority cohort representatives will be involved in the development and review of health brief materials to ensure relevance and inclusivity.

Monitoring and Evaluation of Implementation

To assess the success of these recommendations, a structured feedback mechanism will be implemented, gathering post-deployment surveys and focus group discussions.

Health outcomes (e.g., DNBI rates and compliance with preventive measures) will be tracked to measure the impact. Regularly updated reports will be presented to the FHP Executive Board and used to refine the health brief and inform future health interventions. By systematically implementing these recommendations, the effectiveness of health briefs in promoting behaviour change among Military personnel can be significantly enhanced, ultimately leading to better health outcomes in operational settings.

CHAPTER 7 - CONCLUSION

7.1 Conclusion

This research has provided an in-depth exploration of British military personnel's attitudes and behaviours toward the pre-deployment health brief, a central component of Force Health Protection. The findings reveal significant limitations in the health brief's ability to facilitate meaningful behaviour change, despite widespread recognition of its necessity. While participants demonstrated a high baseline awareness of health risks, much of this

knowledge stemmed from prior experience rather than the health brief itself. Critically, risk-taking behaviours persisted, highlighting a disconnect between awareness and action.

The study identifies several key barriers to the effectiveness of the health brief, including its perceived lack of specificity and engagement. By relying on outdated delivery methods and generic content, the current health brief fails to address the complex factors influencing behaviour change within this unique cohort. Despite advancements in behavioural science and the availability of evidence-based frameworks like COM-B (Michie, 2016), the military's approach to PDT health training may have never been the right approach, missing opportunities to empower personnel with the tools to safeguard their health. This statement can be confirmed anecdotally by those Environmental Health Practitioners who are currently delivering the health brief. This thesis argues that future health interventions must leverage behavioural science frameworks, such as the COM-B model within the Behaviour Change Wheel, to address the psychological, social, and environmental determinants of health behaviours effectively.

The findings underscore the clinical and operational importance of addressing these gaps. Enhanced health interventions could not only reduce DNBI prevalence but also alleviate the logistical and medical burdens on commanders during operational tours. This would ensure a healthier and more capable fighting force, better prepared to achieve mission objectives in austere environments.

Although the research has been limited to mainly British infantry personnel returning from Iraq deployments, its implications extend beyond this specific cohort. Future studies should explore the broader applicability of these findings to other branches of the military and operational contexts. The findings in this research could also be compared to other professions who work in high-risk professions. Additionally, longitudinal research is recommended to evaluate the sustained impact of redesigned health briefs on behaviour and DNBI outcomes.

The participants in this research are likely to deploy again in the future and will therefore benefit from any recommendations implemented. This research also aims to have broader

cultural implications within the military, which involves military personnel putting a greater importance on protecting their own health and those they are responsible for. This research will benefit all military personnel by improving current health preparation.

In conclusion, this thesis contributes original insights into the limitations of pre-deployment health interventions and provides a clear pathway for their enhancement. By embedding behavioural science principles into the design and delivery of these interventions, the military can bridge the gap between knowledge and action, ensuring personnel are better equipped to protect their health and operational readiness in increasingly challenging environments.

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